COAL AGE

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The Mine Mule

(Written expressly for Coal Age)

By Berton Braley

He sees the pleasant daylight only once or twice a year,
When they take him out to gambol on the grass;
But he cocks those funny eyes of his and waves a crazy ear,
And you bet he's wise to all that comes to pass.
He is meaner than the skinner—and the skinner's awful mean—
But he's stronger than the cable on the cage;
And of all the critters underground it's plainly to be seen
That the mule's the boy who always earns his wage!

The skinner is a driver who swears a purple streak,
But profanity is love talk to the mule;
He would kick the gentle miner to the middle of next week,
But when the skinner beats him he is cool.
For the mule he loves the skinner, and the skinner loves him back,
Though you sure would never know it by his talk;
And the mule he hauls a string of cars along the bumpy track
And very, very seldom will he balk.

But if the mule gets sulky he can tangle up the mine,
While the pit boss and the cager stand and swear;
And the cars are backed behind him in a long, unbroken line
And the skinner hops around and tears his hair.
Yet when the mule is ready he will start to work again,
And merrily he hauls the cars away;
For like that guy, Sir Galahad, he has the strength of ten
When he really wants to bring it into play.

So, here's to Mr. Long Ears with the tassel on his tail,
May he prosper like a dividend that's fat;
And when he's done with working and he hits the spirit trail,
May he go where all the saintly mules are at!
Where there isn't any mining and there isn't any coal,
And a skinner is a critter never met;
Where the only occupation is to bray with all his soul
For the mule has earned his Heaven, you can bet!

The Preparation of Bituminous Coal—II

By F. E. Brackett*

SYNOPSIS—The second and concluding article on this subject. This installment discusses gravity chutes and the different types of screens with their comparative advantages and disadvantages. Some valuable data regarding screening areas are given, together with notes and comments on the methods of sizing as practiced in different regions.

In some regions the pan shown in Fig. 1 is very popular. There are a number of different types in use, but the figure shows, perhaps, its most comprehensive form. This pan is not hinged or attached to the chute at its upper end. In its upper position it forms a continuation of the chute, but at a less grade—say 3 in. per foot. Coal entering at the upper end at a high velocity is gradually brought to rest by this change in grade and by the curve at the end of the lower part. The entire pan consists of two separate parts hinged with a bridle, like a clam shell and hung by the bridle at its upper end.

The cables by which it is suspended wind about some sheeves, or small drums, on a shaft, on which there is a band brake. By a proper arrangement of the size of the drums, any ratio of displacement between the upper and lower ends can be maintained; the figure shows a two to one ratio. If the brake be released and the lower end of the chute lowered 2 ft., the upper end will drop one foot. The entire pan is counterbalanced, so as to be held in its upper position when empty. When full of coal, the brake is released and the pan drops to the lower position shown, the "clam shell" being opened by a piece of chain attached to the end.

The whole mechanism can be mounted as a scales for weighing the coal. This arrangement checks the coal more gently than any form of gate, and also shortens the fall after it leaves the pan. It is rather doubtful though, whether this drop is less than could be accomplished by any well adjusted chute. However, where a certain amount of fall is to be neutralized and the requisite horizontal space is not available, this pan certainly does possess a decided advantage. This form of pan is more commonly hinged at its upper end and sometimes, where the main problem is to overcome height, the two parts are made of equal length and just alike. The pan then becomes a short box 10x6 ft. overall, and several feet deep, and when loaded with coal, it slides down on guides to the car, and opens up on the same principle as the one shown. The pan, as well as the monkey, requires some little time for operation, which should not be lost sight of in computing output; the plain gate is much more rapid.

The Question of Sizing

With the smaller sizes of coal carefully separated from one another, the depth of fire on the grate bars can be so adjusted that each size will get proper draught. This process of sizing can be carried on until a grade is obtained so small that it would hardly be possible to carry a fire light enough to get the proper draught, without at the same time having it so thin that holes are liable to be sucked through the fire-bed, and thus reduce the temperature of the firebox.

The minimum of useful size is about one-fourth of an inch, or at least, that is about the smallest mesh used on bituminous-coal screens. However, with mechanical stokers, even the very finest coal can be economically burned, although with these, there is no advantage in sizing below a certain limit. The harder and less coking qualities a coal has, the more advantages there are in sizing. For this reason we find the most extensive sizing plants in the anthracite region, while the least sizing is done to the soft Eastern steam coals.

In general there does not seem to be any great uniformity of practice in sizing, in the bituminous coal fields. Speaking in round figures, lump coal is such as

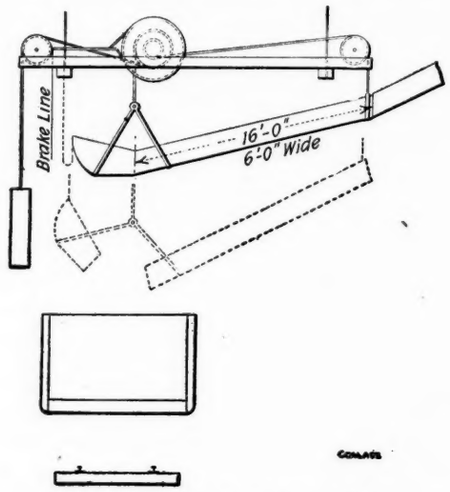

Fig. 1. Pan for Lowering Coal

passes over a 1¼-in. bar screen 12 ft. long and 6 ft. wide. Nut passes through a 1¼-in. bar screen and over a ¾-in.; slack passes through the ¾-in. screen. We do, however, find 2-, 3-, 4-, 5- and 6-in. lump on the market, as well as the various sizes of so called "egg" which these lumps produce. Also pea coal and buckwheat are sometimes made from the "throughs" of the nut screens.

Perhaps these grades are usually about as follows: Nut coal, through 1¼-in. and over 1-in.; pea coal, through 1-in. and over ¾-in.; buckwheat, through ¾-in. and over ¼-in. It would seem that the grades of lump over, say, 4-in., were really superfluous, and that one, below nut coal, was really enough at most. The sizes would then run: Domestic lump, all over 4-in.; lump, all over 1¼-in.; ¾-lump, all over ¾-in.; egg, over 1¼-in. and under 4-in.; nut, over ¾-in. and under 1¼-in.; pea, over ⅜-in. and under ¾-in.; slack, under ⅜-in. However, certain market conditions undoubtedly require further sizing, though in the majority of conditions there are usually less.

Types of Screens

There are three types of screens in use—the bar screen, the revolving screen and the shaking screen. The bar screen is the most popular, and is used to make the first

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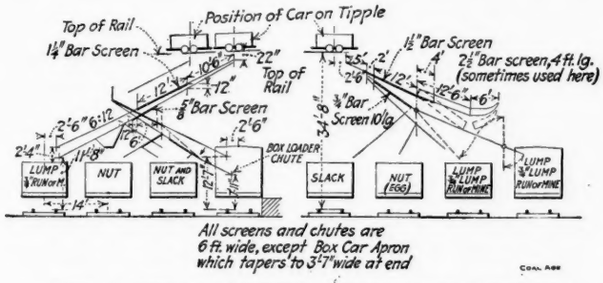
or lump separation in the vast majority of cases. Everything going through the lump screen is treated either on another bar screen, or on some form of the mechanical screen. In some regions, however, the shaking screen is used to make the lump separations as well as the fine-coal separations.

Bar screens are built of a great number of bars, supported on cross pieces, notched to receive the lower edge of the bars. There is usually a little taper in the section between the top and the bottoms; this assists the fine coal in passing through and also helps hold the bar in its supporting notch. The standard lump screen, as before stated, has a 1¼-in. space between the bars, is 12 ft. long and 6 ft. wide. The slope is usually from 4½ to 6 in. per



FIGS. 2 AND 3. TYPICAL CROSS-TRACK TIPPLES

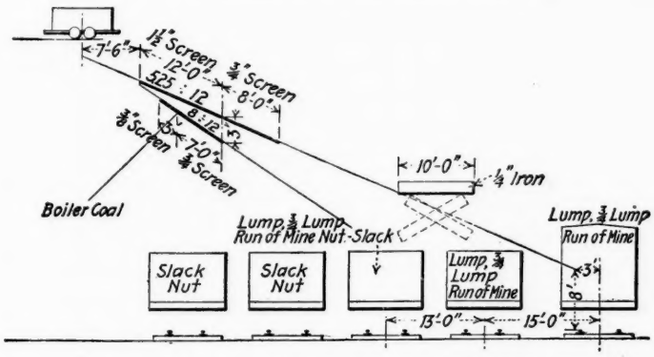


FIG. 4. TYPICAL GRAVITY-SCREEN LAYOUT

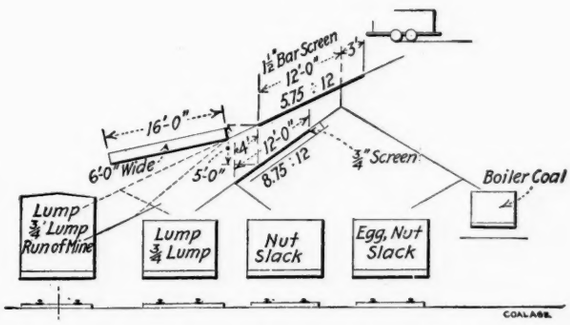


FIG. 5. A DOUBLE LUMP-SCREEN ARRANGEMENT

foot, horizontal measurement. In most cases this is the initial screen and is the only one placed in the chute.

For screening the "through," or fine coal from the lump screen, there seems to be a great diversity of plans. For 6 ft. wide the length of the nut screen has been reduced to 6 ft. without seriously impairing the results. The reason for this is, no doubt, that there is much less coal coming to this screen than to the lump screen, and as it is usually placed under the latter, much of the coal falls right through, instead of sliding along on top of a larger size, for a time. At the same time the customary size for the nut screen seems to be about the same as for the lump.

The capacity of the latter is about three mine cars per minute, or say six tons per minute of run-of-mine coal; usually two-thirds of this goes over the screen and one-third through. It would, therefore, seem that, if convenient, the nut screen could be made smaller than the lump. But since the objection to a little fine coal in the lump is not as great as a like percentage would be in the nut, it would hardly be practical to reduce the area of the nut screen to one-third of the lump screen; coal for commercial purposes, smaller than the nut size, is usually prepared on some form of mechanical screen. For use at the mine, however, smaller bar screens are sometimes placed above the nut screen, so as to take a small quantity of fine slack for boiler purposes. For the larger sizes of lump, the tendency seems to be to shorten the screen.

BAR AND REVOLVING SCREENS

In setting the bars for the bar screens, care should be taken that there is no binder over the top, at the lower end, to hold them; the upper surface of the bars at that point should be placed a little higher than the surface of the sheet iron in the chute. This is particularly important in the fine-coal screens, because small lumps catch on the binder, or on the sheet iron, and the weight of the coal is not sufficient to force the lump past. The screen thus begins to clog, even when given a heavy pitch. The lump screens do not give trouble in this way, under ordinary circumstances, because of the weight of the coal.

The bar screen cannot be replaced by a perforated metal screen, because the coal travels over it too fast to be properly screened. The wire screen is, of course, too rough. For mechanical screens, however, both wire and perforated metal give a high efficiency.

In revolving screens, the screen proper forms the periphery of a cylinder or frustum of a cone. If the form is cylindrical, the axis must be given an inclination of about 5½ deg., or about 1⅛ in. per ft., to force the material to travel through the screen; hexagonal screens sometimes replace the circular ones. The periphery of a revolving screen should travel about 200 ft. per min. There should be about 1 sq.ft. of screen surface for every ton of coal fed into the screen per day of eight hours, when the mesh is ¾ in., and with ¼-in. mesh there should be 2 sq.ft. per ton. If the coal is wet, this should be increased.

Revolving screens are sometimes jacketed; that is, two or more screens are placed concentrically on the same shaft, the inner being the coarsest, and each succeeding screen making additional separations. This reduces the space and height required for the same amount of screening. In other cases, a long cylindrical screen has coarse mesh near its discharge end and finer near the entrance end, thus making two or more through products besides the overproduct.

The disadvantage of "jacketed" screens is that the necessarily slow speed of the innermost screen reduces the capacity of the entire combination, so that if rapid work is essential, it is necessary to use large diameters; there is also some difficulty in renewing and cleaning the

inner jackets. The disadvantage of using two or more mesh of different sizes, placed one after the other on the same frame, is that all the material must pass the finer mesh, which, as a result, is rapidly worn out. Also as more work must be done, the finer mesh must necessarily be of greater area than they would be were they placed so as to screen only that which passes through the larger mesh.

Shaking screens probably possess a greater cleaning efficiency, per square foot of surface, than do the bar screens, and do not require so great a pitch. They occupy must less room and are more conveniently arranged than the revolving screen, which usually requires considerable elevating of the fine coal; the shaking screens are also particularly efficient with wet coal. The principal disadvantage of this type is that the reciprocating motion imparts a destructive vibration to the framing of the building.

For sizing bituminous coal, inclined shaking screens are extensively used in certain sections, particularly in the Middle Western states. These screens are given a shaking motion by means of cams and connecting rods, which make from 60 to 100 strokes per minute, the speed varying according to the amount of moisture in the coal; the throw of the eccentric is about 6 in. The screens are 7 ft. wide and vary in length according to the conditions on the tipple, no standard having been adopted. The average inclination at which they set is 14 deg., or 3 in. per ft., but this angle varies from 12 deg. to 15 degrees.

Screening Area Required

The necessary area depends upon the mesh principally; to screen the run-of-mine coal over a ¾-in. perforated screen for making slack, requires 0.028 sq.ft. of screen per ton of run-of-mine per day of eight hours. If the perforations are 2½ in., then 0.014 sq.ft. per ton per day are required. As with the bar screen, there seems to be some tendency to keep the fine-coal or nut screen about the same size as the lump screen, although only about one-third of the run-of-mine will pass through 1½-in. mesh. Even at three times the above figures, however, the ratio of material passing into the screen, to area of screen surface, is far below anthracite practice, where a screen for fine coal, of about ¾-in. mesh, will have about one-half square foot per ton, per 10-hr. day.

It is interesting to note that at six tons per minute, a standard 1¼-in. lump bar screen has an area of 0.025 sq.ft. per ton per 8-hour day, while the perforated shaking screen requires about 0.028 for the ¾-in. mesh. It is doubtful if these lump-screen areas could be reduced below the maximum capacity of the tipple, regardless of the actual mine output, because the rate of the flow of coal across the screen is fixed by the time of dumping a mine car. To avoid this and secure a more even distribution, feeding boxes or small bins are sometimes introduced above shaking screens, though the writer does not know of any case where these are used above the bar screens. The flow from the box is often produced by a shaking motion. For the fine coal, small bins usually exist at some point, which equalizes to a great extent the flow of the coal passing the lump screen.

For the ¾-in. nut screen, of the stationary or bar type, the usual area would be 0.075 sq.ft. per ton per day. The corresponding revolving screen would require, according to usual practice, about 1 sq.ft. per ton, and the shaking screen on anthracite, ½ sq.ft. per ton per day. It would seem rather difficult to reconcile this wide discrepancy even after making full allowance for the intermittent action of dumping.

The relation between the mesh and the area, however, is much more clearly defined than the relation between the output and the area. Thus, for shaking screens of perforated plates, when the diameter of the perforation is increased from ¾ to 2½ in., or as 3 is to 10, which is nearly four times, then the area required is reduced one-half, in other words, the areas vary inversely as the square root of the diameter of the perforation. A similar result, but more approximate, is obtained from the data on revolving screens. This same law is approximately borne out in anthracite practice.

A word might be inserted here about the bins or pockets for fine coal, usually found at bituminous plants. It is not often that these are large enough to carry

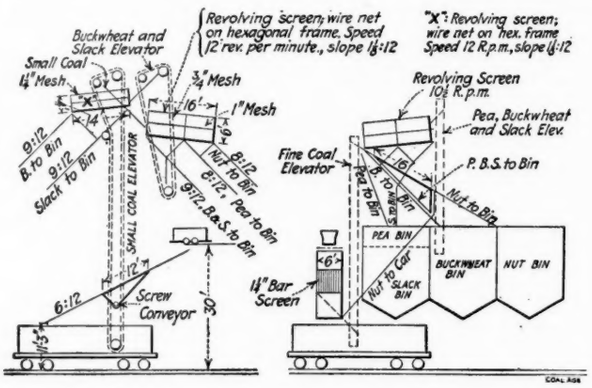


Fig. 6. End-dump Tipple Fig. 7. Fine-coal Bins

more than a few days' run, the main object being to allow a carload of the fine to accumulate before it is loaded into the car. Unless these bins are used, there must be a separate track and railroad car for every grade of coal made. With some arrangements, this is more convenient than the bins, but in other regions we find the bin plants more popular.

Tipple and Screen Arrangements

The various combinations of dumping and screening apparatus are, of course, almost endless. There are, however, two main types which will be briefly described. They are the "cross track" plant, with bar screens or shaking screens, and the "end dump" plant, with or without elevators and bins.

In Figs. 2, 3, 4, 5, 9 and 10 are shown typical plants of the "cross track" type with bar screens; Fig. 2 is a double plant consisting of two tipples or dumps and two sets of chutes and screens, one set being preferably used to load box cars. Many of the other figures represent one-half of a double plant, the second tipple and chutes being exactly or nearly the same as the ones shown. There are seldom more than two screens on the same set of chutes used in these plants. The sizing, therefore, confines itself to lump, nut and slack.

In most cases the nut screen is placed directly beneath the lump and is of about the same length and area as in Figs. 3 and 10. In other cases the nut screen is displaced or moved down the chute a little below the lump screen, as in Figs. 2 and 5. Figs. 4 and 9 show two

screens in succession on the main chute. The ¾-in. lump, produced in Fig. 4 by covering the 1½-in. screen, is not the equal of that produced by screening fine over 1½ in. and then adding the nut coal, from the ¾-in. nut screen, to the lump car. In this particular case, it would seem that the ¾-in. screen, being only 8 ft. long, was not sufficient to properly screen the coal. According to established principles and data on screens, given elsewhere in this article, it appears that if 12 ft. were sufficient for a 1½-in. lump screen, that 17 ft. would be the proper length for a ¾-in. lump screen, and not 8 ft. as shown. In the writer's experience ¾-in. lump screens, 12 ft. long, are not sufficient.

It will be noticed that by throwing the chutes across a system of tracks that each grade is conveniently loaded on a separate car with the arrangement of chutes shown in Fig. 9. The height required from top of railroad track to top of mine-car track on tipple is usually about 35 or 40 ft., according to the arrangement. Fig. 10 was laid out to obtain a maximum of convenience with a minimum height.

If shaking screens are used, a similar arrangement of tracks is still convenient. The arrangement of the screens in succession along the main chute, instead of passing lump coal over one screen only, seems more popular with the shaking screens. The reason for this is, no doubt, the increased efficiency in cleaning. This also makes the small coal chutes less complicated, and generally compacts and simplifies arrangements. The low fall required avoids the necessity of much building where height above the railroad does not already exist. Of course, there is an objection, as previously pointed out, to passing the lump coal over every screen, especially the small mesh, but advantages with this particular type seem to have overbalanced this disadvantage. These screens may and should be fed from a feeder box and not from a tipple direct.

The End-dump Tipple

The "end-dump" plant, with elevators and revolving screens, is shown in Fig. 6. The advantage of the end chute is to give a better turn to the cars. Some attempts have been made to turn the ends of "cross chutes" for the same purpose, so as to make them load in an endwise direction. These are called radical chutes, and if properly built, are successful but rather cumbersome. With chute and tipple or dump arranged as in Fig. 6, the point at which the fine coal leaves the pocket beneath the lump screen, makes it inconvenient to carry screening any further, or indeed to dispose of the screenings at all without elevators. Hence elevators and revolving screens are the logical accompaniment of this arrangement.

To avoid many tracks and delays of railroad cars, or waiting on railroad cars for the smaller coals, the fine coal is usually run into a series of bins, which are placed over a single track called the fine-coal track. Figs. 7 and 8 are two views of the same tipple. This is hardly typical, as it represents a combination of the two types, without any well deferred attempt to take full advantage of either. It is, no doubt, the result of the peculiar surroundings.

Before selecting any particular arrangement or preparation for a given locality, all questions must, of course, be carefully considered, the principal details being the texture of the coal, market demands and topography of the surface.

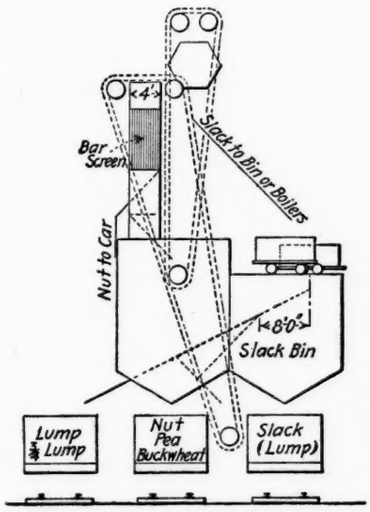


Fig. 8. A Fine-coal Loading Arrangement

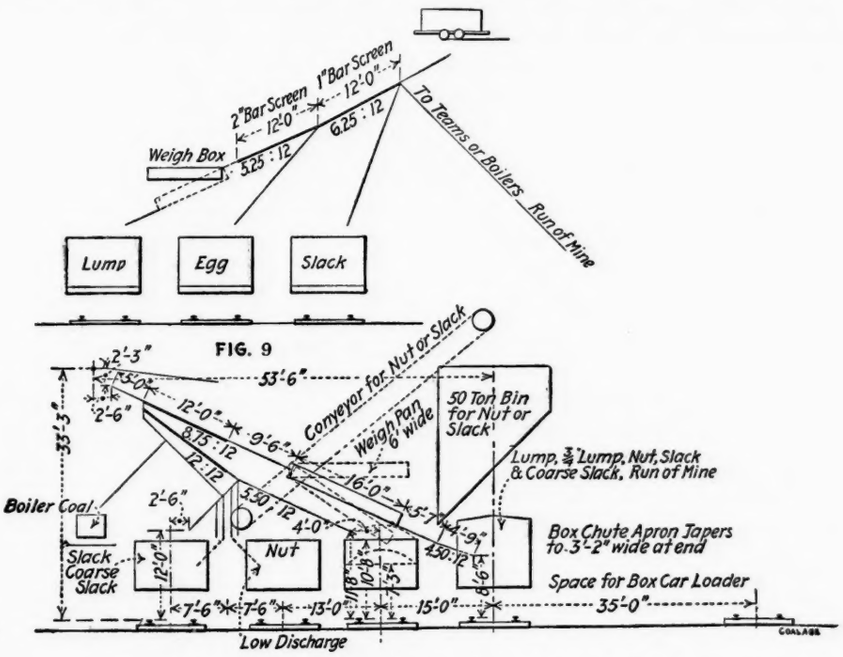
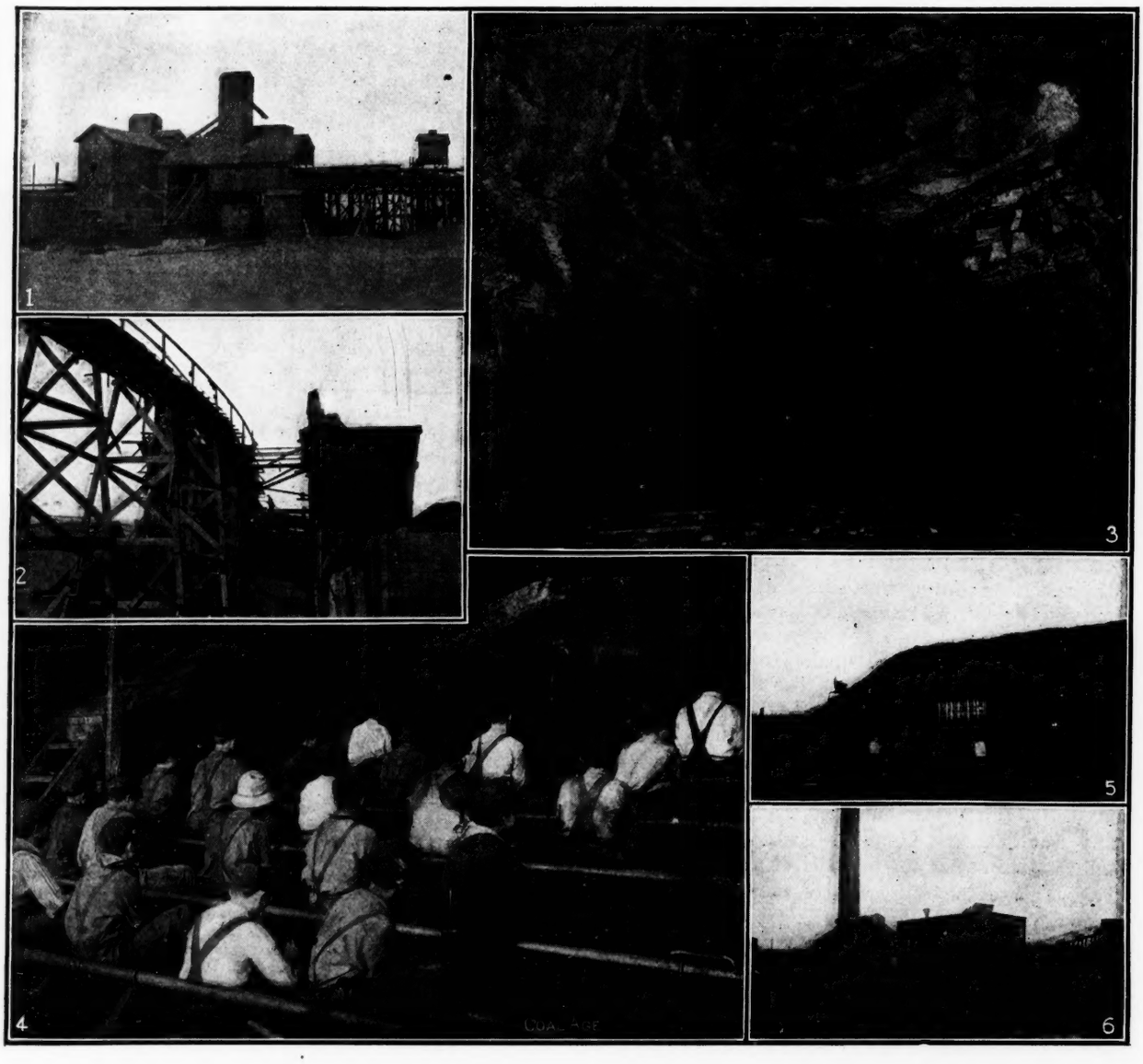


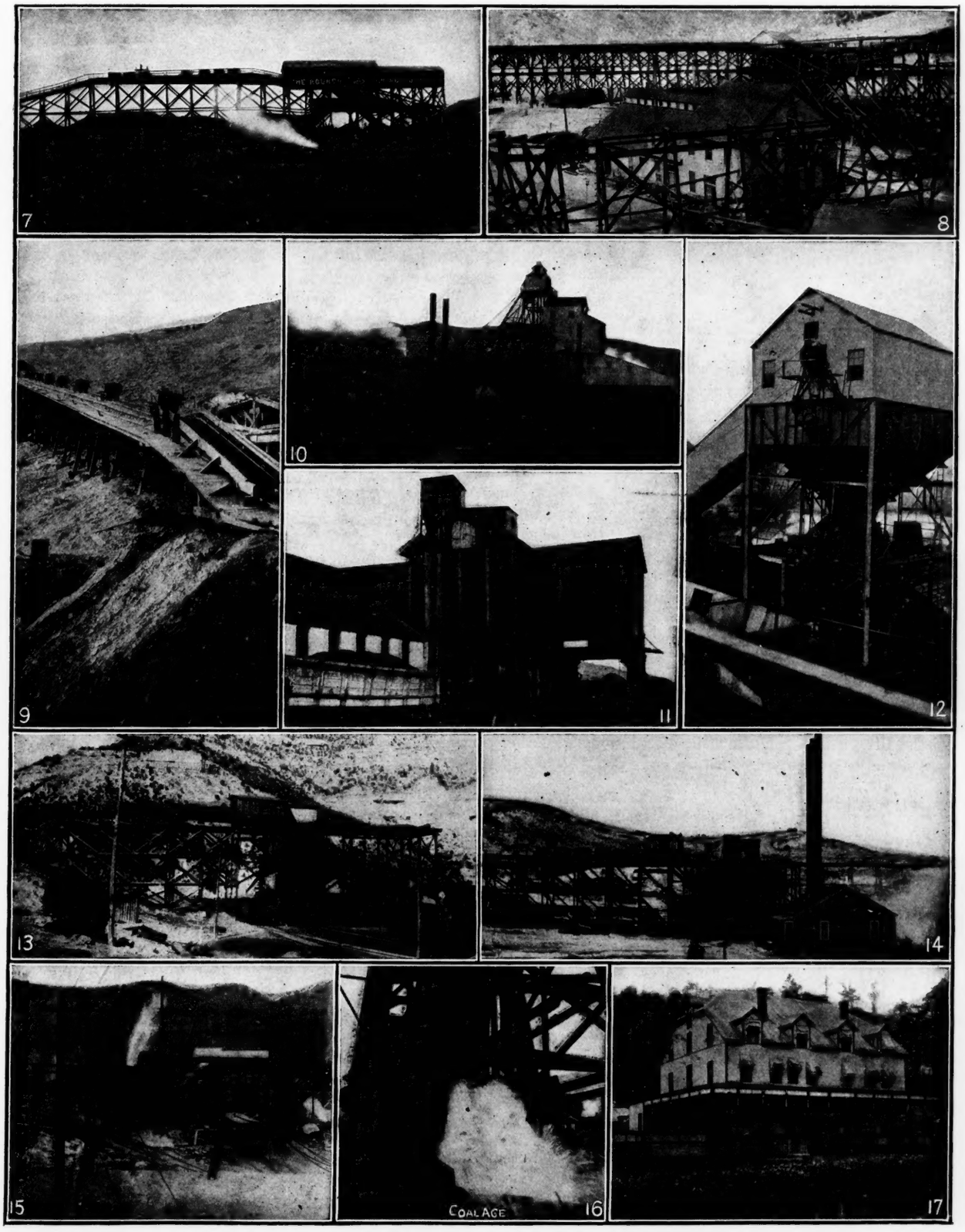
Fig. 10. A Typical Layout to Obtain the Maximum Convenience with the Least Height

To trace the path of an explosion is a matter calling for the exercise of patience and keen observation. The following points will be found of assistance when undertaking such a task: (1) Deposits of fine dust on the faces of crossbars and timbers. (2) The abrasion of sharp projections on the pillars of coal. (3) Heavy material forced from its position and carried in a definite direction. (4) The formation of eddies of dust in the corner of timber sets and passage ways; these eddies are invariably found on the side opposite to the origin of the blast. (5) Coke dust and other materials, forced into corners of projecting sidewalls, in the same direction as the force of the explosion. (6) The bending of switches and the direction in which timbers and wagons are carried.

SNAP SHOTS IN COAL MINING

1—Sweetwater tipple. Central Coal & Coke Co., in Wyoming.
2—Tipple and trestle of the Oakdale Coal Mining Co., in Colorado.
3—Underground view in Consolidation Coal Co.'s Mine 32, West Virginia division. The place is being prepared for a concrete overcast.
4—Slate pickers in an anthracite breaker.
5—No. 2 Dominion Coal Co., Glace Bay, N. S. Loading banked coal for shipment.
6—Dominion Coal Co.'s No. 6 slope, showing boiler house, compressor house and tipple.
7—General view of the Roundup Coal Mining Co.'s mine at Roundup, Mont., on the Chicago, Milwaukee & Puget Sound R.R.
8—Trestles at mine of Cambria Fuel Co., Wyoming.
9—Car haul at mine of the Bear Creek Coal Co., Montana.
10—Steel tipple at Mine No. 7, West Kentucky Coal Co., Sturgis, Ky.
11—Bear Creek Coal Co. tipple, Montana.
12—Showing steel tipple of Wyoming Coal Mining Co.
13—Tipple of Consolidated Fuel Co., in Utah.
14—Second view of colliery, Oakdale Coal Mining Co.
15—Shaker screen being placed in position at mine in Utah.
16—Tank discharging water from the Gilberton Colliery water-hoisting shaft.
17—"The Inn," company hotel of Clinchfield Coal Corp., Dante, Va.





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Last Year's Coal Mining Accidents

By R. Dawson Hall

SYNOPSIS—A large reduction in the important coal-mine disasters of the United States was effected in the year 1912. Whereas in the previous year, 444 were killed in accidents involving three or more persons, last year only about 254 men died from misadventures of like severity. The greatest disaster in the year was the explosion of the Yubari mine, and of this a brief account is given. Many of the present-day disasters result from too brief an acquaintance with fields which have unforeseen dangers.

The compilation of a list of the accidents of any year is made difficult by the fact that early reports of the smaller domestic accidents and of all foreign catastrophes are the only statements which can be obtained till the annual reports slowly appear.

When the final reports are published, from one to two years after the event occurs, the number of recorded deaths is apt to be decreased in the case of foreign accidents, owing to rescues effected or men escaping after the last report available.

Figures of domestic accidents are liable to be underestimated in our tabulation because after explosions the living victims are so badly injured that death often supervenes. When these further deaths occur, they are rarely reported except to the inspectors or the national bureau and consequently the figures published at the end of the year are frequently too low.

With this introduction, it will easily be understood why the list is only approximately correct. It may omit some important accidents, though it gives almost a complete account of the principal mine disasters in America and the British Isles. Unimportant explosions and other accidents are purposely omitted.

Larger Accidents in Coal Mines of the United States Killed 254 Men

Excluding all accidents where less than three were killed, there were 254 fatalities in our coal mines last year. Great Britain's deaths similarly calculated amount to 117 and those of Canada to 7.

The estimate made by the Bureau of Mines of the number of coal-mine workers killed in the United States during 1911 in accidents killing over two men at one time was 444. Consequently the fatalities this year show a distinct improvement even if we allow a large margin for inaccuracy in the estimate which I have made. The drop given is 43 per cent., quite a noticeable reduction.

A Week of Gloom

The greatest domestic mine disaster of the year was that at Jed, W. Va., where 81 persons were killed, the next that at Chant No. 2, in Oklahoma, where there were 74 victims. These accidents came within a week of each other. The first would probably not have occurred had the Jed Coal Co. supplied their men with safety lamps, as was ordered by the inspectorate. The second was probably due to the fact that the men, who were awaiting the clearing of their working place of gas, sat down where the escaping gas passed over their open lights. In fact it is a question whether Chant ought ever to have been worked as an open-light mine.

Part of the improvement in the fatality rate is due probably to our mild and damp winter. "A green Christmas makes a full graveyard." But this is not the case with the mining industry and credit must be given to the weather for its work in making the mines safer than they would otherwise have been. Though we did not have a green Christmas, the winter generally has been mild and marked by frequent rains or soft snows.

The British coal-mine death rate has only been swelled in the past year by one large catastrophe, that of Cadeby Main colliery. At this disaster, 89 persons lost their lives. Had it not been for that explosion, the British record would have been remarkable. But the frequency of mine fires seems to suggest that large disasters were only avoided by a hair's breadth.

The Lack of Precaution in English Mines

Simply as an example, I call attention to the fire at the Headly Park colliery, Feb. 26, which occurred in an oil house on the main haulage-way. For a while it threatened to duplicate the Old Hednesford disaster and it might easily have been as unfortunate as the Price-Pancoast fire. Only two days before, at St. Helen's colliery, a fire took place with 470 miners in the pit. It was only with great difficulty that they finally got out.

The German record is peculiarly bad and would appear worse if we had as complete a record of fatalities as for the United States or Great Britain, and especially if compared with the output of coal in the Empire. Six accidents caused 183 deaths.

The record may be unrepresentative of the true conditions; certainly it does not suggest that the German laws give the mine worker a superlative assurance of safety. Some close observers have been of the opinion that an excess of gold braid on the persons of all officials in charge makes it necessary in Germany to give the mines "absent treatment."

Other Disasters in 1912

France had two bad accidents; one an explosion at La Clarence colliery resulted in the death of 61 persons; the other was from a less common cause, an outburst of carbon dioxide. A Russian explosion is said to have destroyed 45 lives and a fire in Tasmania, from the blowing of a motor fuse, is said to have suffocated 42 men. This fire was, however, in a metal mine.

Little has appeared relative to the greatest catastrophe of the whole year. So little has been said of it that an account may be fitly inserted here. On Apr. 29, at 11 a.m., a violent explosion occurred at the Yubari mine, in the island of Yezo, Japan, which, not satisfied with killing all of the 278 miners and officials in the workings, destroyed the mine buildings on the outside killing 6 men and injuring 5 more.

A brisk fire succeeded the explosion and in the report made in the *Japan Weekly Mail* of May 18, the statement is made that on May 8, only 106 bodies had been recovered, so fierce was the struggle needed to combat the fire in the mine.

Reference should be made here to an explosion reported to have taken place on Dec. 23, at Sapporo, on the same island of Yezo, only about 40 miles from the ill-fated Yubari mine. The *Echo des Mines et de la Métallurgie,* of Paris, reports that of 200 miners in the workings only three have been saved. As the brief mention is unconfirmed, the figures have not been added to those in our table or in our summaries of results.

The Bad Record in Japan

Japan has probably the worst record in the world for mining disasters. It is strange because Japanese companies seem more solicitous about the care of their employees than those of any other nation. The *Nichi Nichi,* a native organ, quotes the following table as an average for five years, ended 1909.

DEATH RATE OF MINERS

	Deaths	Deaths from explosion	Percentage
Japan	2381	1209	58.8
Great Britain	5789	419	7.3
Germany	5729	589	10.3

The *Nichi Nichi* states that explosions in Japanese coal mines can be traced mostly to carelessness on the part of the miners. Match boxes carried with them into the pits often prove to be the cause of catastrophes.

Not Cognizant of Danger Till Warned

Perhaps we may congratulate ourselves not only on a lower death rate this year than last, but on the gradual movement toward safety in the mines. The fact is sometimes overlooked that it takes a certain number of years and a few disasters to exhibit the dangers of any coal field.

They nearly all look harmless enough when first opened. The danger is usually revealed by a tragedy. Nearly every new field has its peculiar dangers and until they are discovered and duly measured, accidents will happen. Until death has shown the way it remains undiscovered.

We are beginning to size up conditions in the United States with some accuracy. In Colorado, Utah, Iowa and Oklahoma, they are watching the extremely dry and

IMPORTANT ACCIDENTS IN 1912 AT HOME AND ABROAD

Date	Colliery	Place	Company	Number Killed	Cause	Other Notes
Jan. 9	Parish-No. 9 Slope	Plymouth, Penn.	Parrish Coal Co.	6	Gas explosion	2 seriously injured
Jan. 12	Knickerbocker	Shenandoah, Penn.	Philadelphia & Reading Coal & Iron Co.	0	Explosion of dynamite caps	6 seriously injured
Jan. 17		Central City, Ky.	Central City Coal & Iron Co.	5	Explosion	200 had just left mine
Jan. 20	No. 4 Mine	Susie, Wyo.	Kemmerer Coal Co.	5	Dust explosion	20 injured
Feb. 12		Antonienhuette, Prussia		27	Mine fire	
Feb. 19	Yard	Bickeshaw, England	Abram Coal Co.	2	Mine fire suffocation	
Feb. 22	No. 5 Mine	Lehigh, Okla.	Western Coal & Mining Co.	8	Mine fire	
Feb. 22	Powell Duffryn	Bargoed, Wales		..	Explosion	3 injured, 2000 in mine
Feb. ?	Bentley	Near Doncaster, Yorkshire, Eng.	Messrs. Barber, Walker & Co.	3	Gas explosion	
Mar. 7	No. 3	Merritt, B. C.	Diamond Vale Colliery Co.	7	Gas explosion	2 injured, only 18 in
Mar. 11	Bentley	Near Doncaster, Yorkshire, Eng.	Messrs. Barber, Walker & Co.	3	Gas explosion	6 men injured
Mar. ?	Great Western	Pontypridd, Wales		2	Outburst of gas	
Mar. 16	Italianka	Uzovka, Russia		45	Explosion	
Mar. 20	Chant No. 2	McCurtain, Okla.	San Bois Coal Co.	74	Gas explosion	105 men underground
Mar. 26	Jed	Jed, W. Va.	Jed Coal & Coke Co.	81	Gas explosion	93 men underground
Mar. 27	Navigation	Bedwas, Wales		3	Gas explosion	
Apr. 21	Coil	Madison, Ky.		6	Explosion	
Apr. 30	Yubari	Yubari, Yezo, Japan	Hokkaido Coal Co.	283	Gas explosion	
Apr. 30		Marvel, Ala.	Roden Coal Co.	...	Gas explosion	8 injured
May 18		Newport Monmouthshire, England		4	Explosion	Many injured
May 18	Markham	Holybush, Wales		5	Gas explosion in sinking	
May 28	Duke	Hindley, England	Messrs. Crompton & Shawcross	3	Fall of roof	
June 6	Trane	Gilfach Goch, Wales	Britannic-Merthyr Colliery Co.	4	Gas explosion in sinking	
June 18	Hastings	Hastings, Colo.	Victor-American Fuel Co.	12	Gas explosion	
July 3		Osterfield, Germany		16	Explosion	
July 6	Barnsley Main	Hoyle Mill, Yorkshire, Eng.		3	Explosion	
July 9	Cadeby Main	Cadeby, Yorkshire, Eng.		89	Explosion from gobfire	37 in first explosion 51 in second 1 in later-recovery
July 11	Burnside	Shamokin, Penn.	Philadelphia & Reading Coal & Iron Co.	2	Fall of rock	
July 17	Gayton	Gayton, Va.	Old Dominion Coal Development Co.	6	Explosion	3 seriously injured 90 in mine
July 17	No. 5	South Wilkes-Barre	Lehigh & Wilkes-Barre Coal Co.	3	Gas explosion	4 injured
July 18	Langcliffe	Avoca, Penn.		0	Gas explosion	9 burned
July 19	Lignite Mine	Near Halle, Germany		1	Dust explosion	7 injured severely
July 20	Panama		Ben Franklin Coal Co.	8	Explosion followed by fire	Others injured
July 24	No. 8 slope	Plymouth	Delaware & Hudson Co.	2	Gas explosion	2 injured
July 24	Superba No. 2	Evans Sta., Penn.	Superba Coal Co.	15	Stream overflowed mine	
	Lemont No. 1	Evans Sta., Penn.	H. C. Frick Co.	3	drowning workmen	
Aug. 8	Lothringen	Gerthe, Westphalia, Ger.		110	Gas explosion followed by fire	23 injured
Aug. 13	Abernant	Abernant, Ala.		19	Gas explosion	58 in mine
Aug. 23	Lincoln		Philadelphia and Reading Coal and Iron Co.	2	Premature explosion of blast	1 seriously injured
Aug. 30		Gelsenkirchen, Germany		5	Collapse of platform in shaft	
Sept. 3	La Clarence	Calonne-Richouart, Pas de Calais		61	Gas explosion	Normally 350 in shaft, only 70 to 80 at time of explosion
Sept. 11	Westende	Duisberg, Germany		5	Gas explosion	
Sept. 13	Mineral Springs	Parsons, Penn.		0	Gas explosion	4 badly hurt
Sept. 14	Mocanaqua	Mocanaqua, Penn.		0	Gas explosion	5 badly hurt
Sept. 15	No. 7 Netherton	Dudley, England	G. H. Dunn Executors	1	Gas explosion	9 injured
Sept. 16	Coral	Coral, Penn.	Wharton Coal Co.	1	Fire and explosion	2 injured
Sept. 17	Augusta-Victoria	Germany		20	Collapse of partition	
Sept. 20		Middlesboro, Ky.	Continental Coal Co.	3	Explosion of gunpowder	1 severely burned
Sept. 26	Roland Darnell	Craig, Okla.		1	Explosion due to blown out shot	Sets fire to mine
	Oak Hill	Clinton Vermillion Co., Ill.		2(?)	Shooting after regular hours	
Oct. 25	No. 3	Kansas	Mayer Coal Co.	2	Windy shot caused explosion	1 severely injured
Nov. 1	Superior No. 2	Superior, Penn.	Latrobe and Connellsville Coal and Coke Co.	2	Fall of rock	2 injured
Nov. 8	Simpson Brooks	Lafayette, Colo.		1	Explosion	5 seriously burned
Nov. 16	Clifton		Dering Coal Co.	2	Explosion	Shotfirers
Nov. 18	Massillon	Massillon, Ohio	Massillon Coal Mining Co.	2	Fall of cribbing and quicksand	
Nov. 22	Peoria	Peoria, W. Va.		2	Gas explosion	
Nov.	Barnum	Pittston	Pennsylvania Coal Co.	0	Fall of roof	18 injured
Dec. 3	St. Martin de Valgalgues	Alais, Gard, France	Nord d'Alais Colliery Co.	24	Outburst of blackdamp	40 men in mine
Dec. 30		Tamaqua, Penn.		1	Inundation from another mine	8 rescued after considerable exposure

explosive dust; in the Rocky Mountains, they are learning the inflammability of dried timber; in Ohio, they are endeavoring to meet the mine-fire problem, and in West Virginia, the question faced is that of the leakage from gas wells.

The Unsolved Dangers in Foreign Countries

But foreign countries are also having to contrive answers to new problems as new parts of old fields and new regions are opened. In British Columbia, the trouble is with a roof rock which strikes fire as it falls to the ground. In India is a rock, which breaks loose so suddenly as to create terrible air blasts in its descent. In the deeper workings of Yorkshire, spontaneous combustion in gaseous mines is an ever-present menace. In Germany and France, the outbursts of carbon dioxide create a danger not known in the United States.

At the Alais mine, in southern France, the management has provided rescue chambers, so that men may have a place to which to flee when the gases escape. But such a chamber is of little use when the dust is blown clear to the surface and men are blackened with the projected coal is if they had been burned.

The recent outburst was probably not so severe as to cause the ejection of coal from the shaft mouth, but only those near the landing escaped. They became aware of the accident by the extinguishment of their lights. The shots at Alais are fired from the surface, not to prevent coal-dust explosions from killing the shotfirers, but to protect these workmen from a possible outpouring of dioxide if a crevice is laid bare.

The Explosion in Council

Safety cannot come with a bound. Both operators and men have to be convinced against their will. There is a fight against permissible explosives, safety lamps, the pocket-searcher or some other provision. When the matter is in heated discussion and is about to be settled or shelved on economic grounds, union politics or for the sake of industrial peace, a violent explosion settles the question in a peremptory fashion.

It is to be hoped that we may hereafter have the wisdom to meet the issue before it is thus forced. The evidence seems to favor the idea that eventually the United States may be a leader in the matter of safety.

The Bureau of Mines has done a great deal to enforce the teaching which has been derived from foreign accidents and to popularize the researches which have been made by alien bureaus and commissions. That instruction was preceded and has been supplemented by many ingenious devices which have been originated by clear thinkers at American mines.

There has been too much bickering as to the relative merit of the bureau's work, the labors of the technical press, the ideas imported from abroad, the talent at the mines and the efforts of the inspectorate. Certain it is, that all these factors will eventually combine to make our mines much safer.

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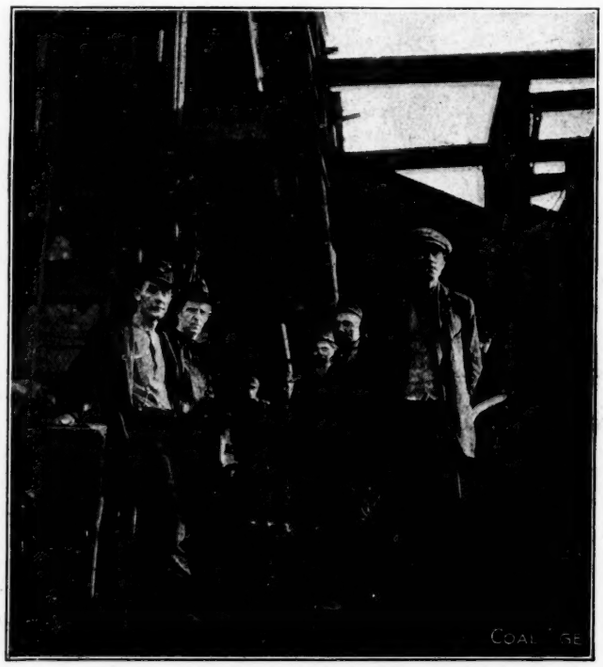
Motor rooms should, when possible, be cut out of stone rather than located in the coal seam. If this is impossible, side walls of fireclay brick should be used. No wood or other inflammable material should be used in their construction. They should be equipped with safety lamps for the detection of gas and pails of sand for use in case of fire, and also with a set of printed rules governing the treatment of persons injured by electric shock. All dust in the vicinity of motor houses should either be removed or thoroughly wet down.

A Spectacular Rescue

Special Correspondence

About noon on Tuesday, Dec. 31, of last year, a break occurred in the East Lehigh colliery at Tamaqua, Penn., which caused the death of one man and the imprisonment of eight others for 34 hours. The mine is operated by E. M. B. Shepp, C. S. Shindel and James Tinley. It is a steep slope 310 ft. deep and it is said that some 20 years ago the same number of men were entombed by an explosion of firedamp and were rescued after nine hours.

The present disaster was due to a body of water standing in the old workings above those now in operation, breaking through and flooding the latter. It appears that danger from this source had been anticipated as, apparently, a bore hole had been drilled through the pillar which failed, some ten days previous, and the water allowed to drain off. After the water ceased running in



Mine Mouth of the East Lehigh Mine

the hole it was assumed that it had all been removed, and the men were permitted to return to work in the adjoining places. It must have been, however, that the hole had simply become clogged.

The break occurred in breast No. 38, about 1710 ft. from the shaft bottom. All the men on the outside effected an escape, although with difficulty in some instances, and those on the inside were caught.

The rescuers had little difficulty in pumping the water out, but it was found that the gangway was choked with débris for several hundred feet. Tappings of the entombed men were heard on the same afternoon or evening, so systematic and determined efforts for rescuing them were undertaken. Over 200 men were employed, the gangs working up to their maximum capacity and being relieved at short intervals. Considerable care had to be exercised in this recovery work, as the conditions in the gangway were quite unsafe. It was 10 o'clock of the following night before the rescue was finally effected.

A Modern Steel Tipple in Pennsylvania

By A. Kauffman*

SYNOPSIS—A brief description of a modern steel surface equipment, having a rated capacity of 4000 tons per day. The plant is divided into two distinct units, each of which may be operated entirely independent of the other. Special provisions are made for effecting a thorough hand picking of the coal.

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At Colver, 28 miles from Ebensburg, Penn., on the Cambria & Indiana R.R. is located the new mine of the Ebensburg Coal Co. just recently put into full operation. The surface arrangement at this mine consists of what may be termed a double or duplicate tipple, each a complete unit which can be run entirely independent of the other and having a capacity of loading 4000 tons of bituminous run-of-mine coal per day. The preparation of coal is second in importance only to the cost, and knowing that in order to satisfactorily clean and load this enormous tonnage, new arrangements for picking the foreign matter from the coal must be made, considerable attention was given to the picking tables, and the handling of the slack coal and refuse; also the disposal of rock coming from the mine. Fig. 6 shows diagrammatic views, and Figs. 2 and 1 a view of the approach to, and the outside of, the tipple. There is a storage capacity of 200 cars on each loaded track; the cars have a capacity of 1½ tons of coal. They are brought to the foot of the feeder hauls in the tipple by electric motors in trips of from 75 to 100 cars. The motor cuts loose at this point and pushes the trip on the hauls from behind.

These feeder hauls are driven by a variable-speed motor so that a minimum capacity of four cars per minute, or a maximum of six cars per minute, can be obtained. At the head of the feeder, there is a slight incline, allowing the forward car to settle back against the trip, thus making it easy for the attendant to draw the coupling pins. The feeder haul consists of a heavy steel, Link-Belt roller chain, with forged-steel tumbling hooks to engage attachments on the bottom of the mine cars; the drive is fitted with a friction clutch to allow starting and stopping without shutting off the power.

After leaving the feeder the loaded car passes on over a track scale, which is equipped with a quick-weighing dial and then to the Phillips crossover dumps. The empty mine cars, coming from the kickback, are raised to the proper elevation by the empty car haul, which also acts as a trip maker and has a capacity of pushing 75 empty cars around a curve having a radius of 100 ft. Fig. 4 shows the two loaded car hauls in the center and the empty hauls or trip makers at each side of the tipple.

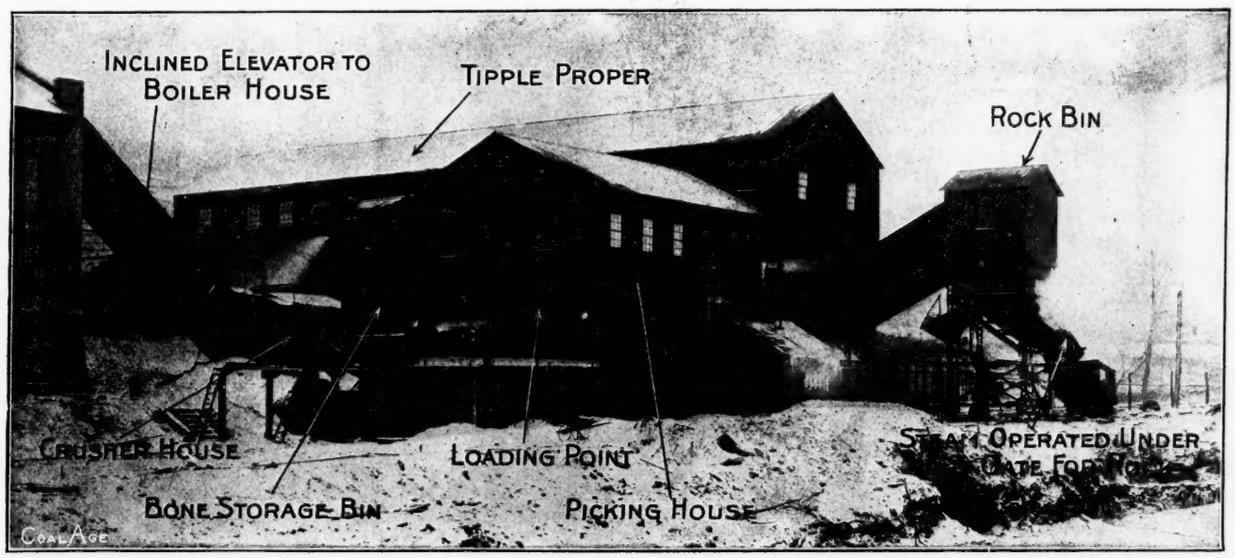


Fig. 1. General View of the Ebensburg Coal Co.'s Tipple at Clover, Penn.

After the mine car has reached the dump, the coal is received by a steel hopper, the bottom of which is fitted with a reciprocating feeder to insure a uniform amount of coal being delivered to the shaking screen; this quantity is regulated by adjusting the length of stroke of the feeder plate. The shaking screen is for the purpose of separating the lump from the fine coal to facilitate the picking of the slack and bone coal from it. The large coal, which passes over the screen, is delivered to the picking band, while the fine portion, which passes through the screen is collected in a shaker chute and fed to a combined slack coal and refuse conveyor located midway between the two picking bands.

These bands are each located over the corresponding loading track, as shown in cross-section. They are of the Link-Belt overlapping corrugated apron type, 60 in. in width, and have 35 ft. of clear length for picking. Moving at a speed of 40 ft. per minute, the picking is done by men stationed along the side of the band. With practically all of the slack coal eliminated and the large lumps spread evenly over the table, an excellent opportunity is afforded the pickers to get at all the impurities; Fig. 5

*Link-Belt Co., Nicetown, Philadelphia, Penn.

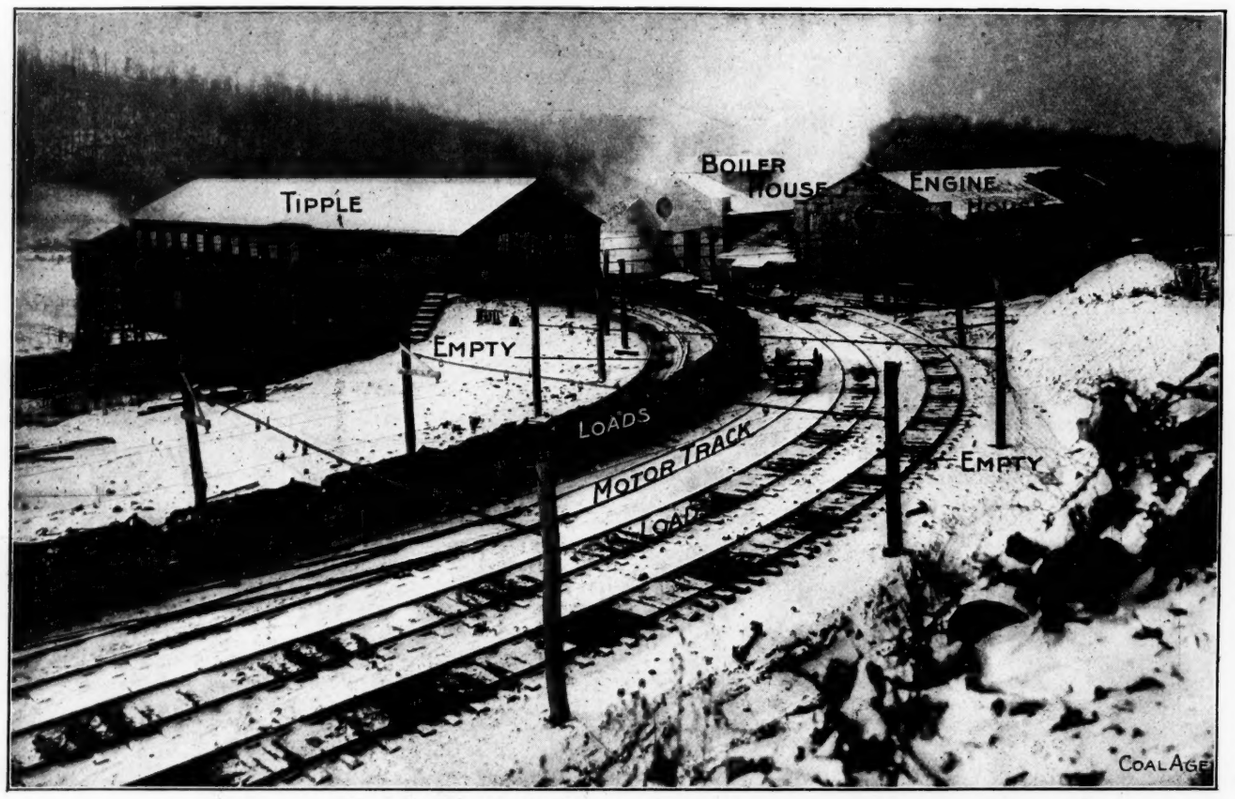


FIG. 2. MINE-CAR TRACK ARRANGEMENT, SHOWING LARGE STORAGE CAPACITY

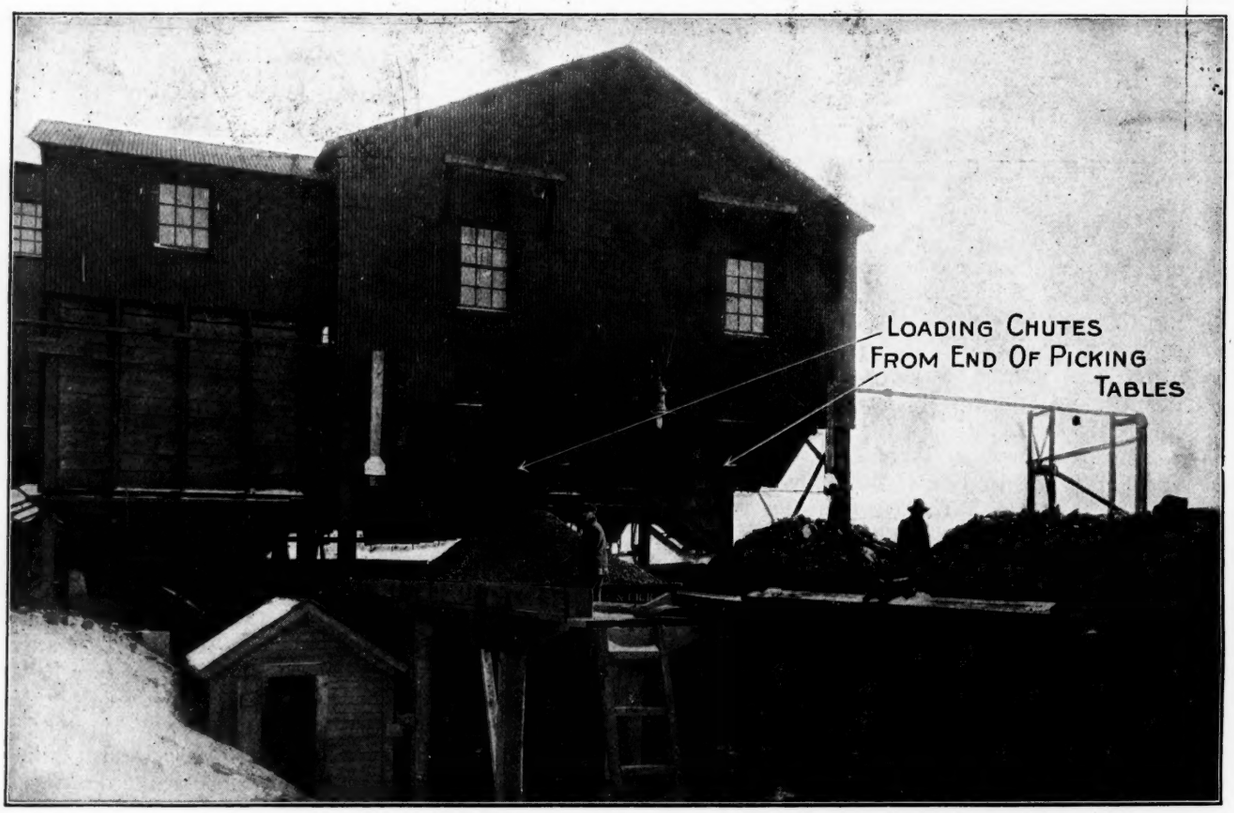


FIG. 3. NEAR VIEW OF THE TIPPLE, SHOWING THE METHOD OF LOADING CARS

FIG. 4. VIEW ON THE TIPPLE, SHOWING CAR-HAULS AND METHOD OF OPERATION

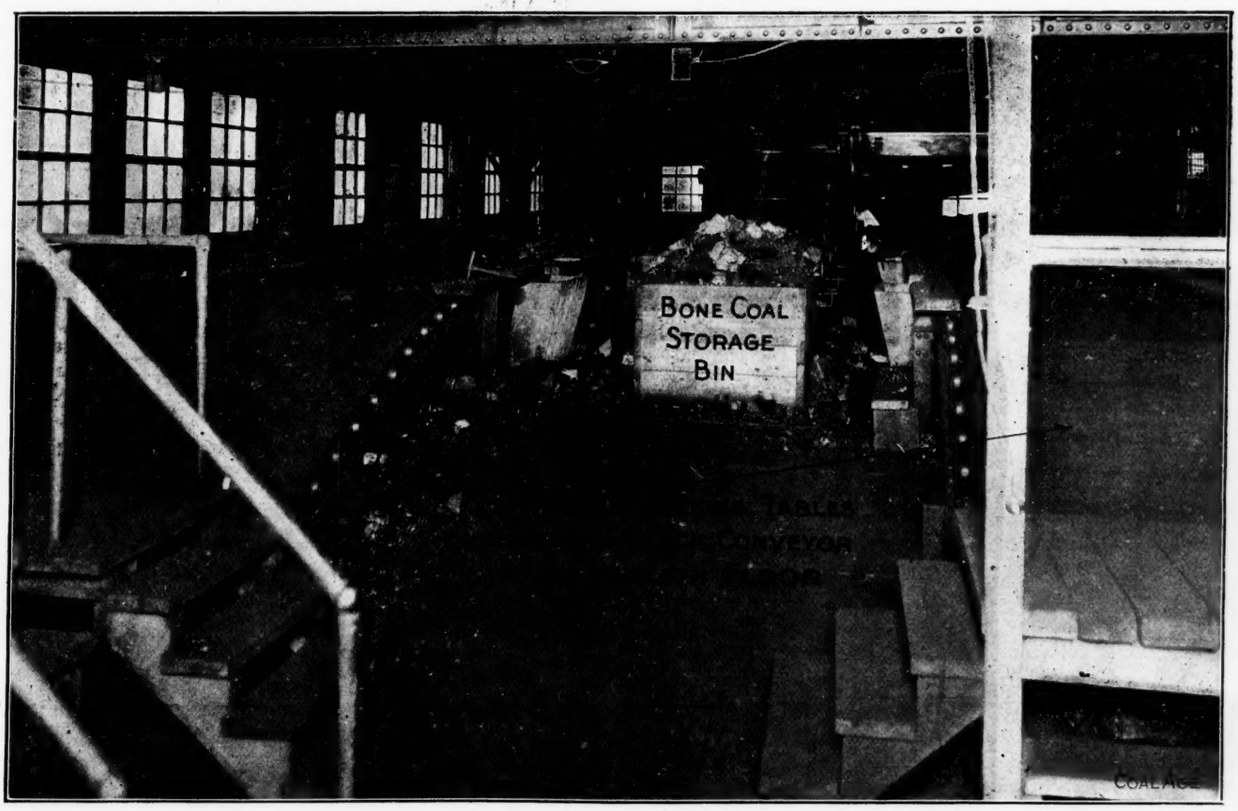


FIG. 5. TWO OVERLAPPING, CORRUGATED APRON TYPE PICKING BELTS, 35 FT. LONG

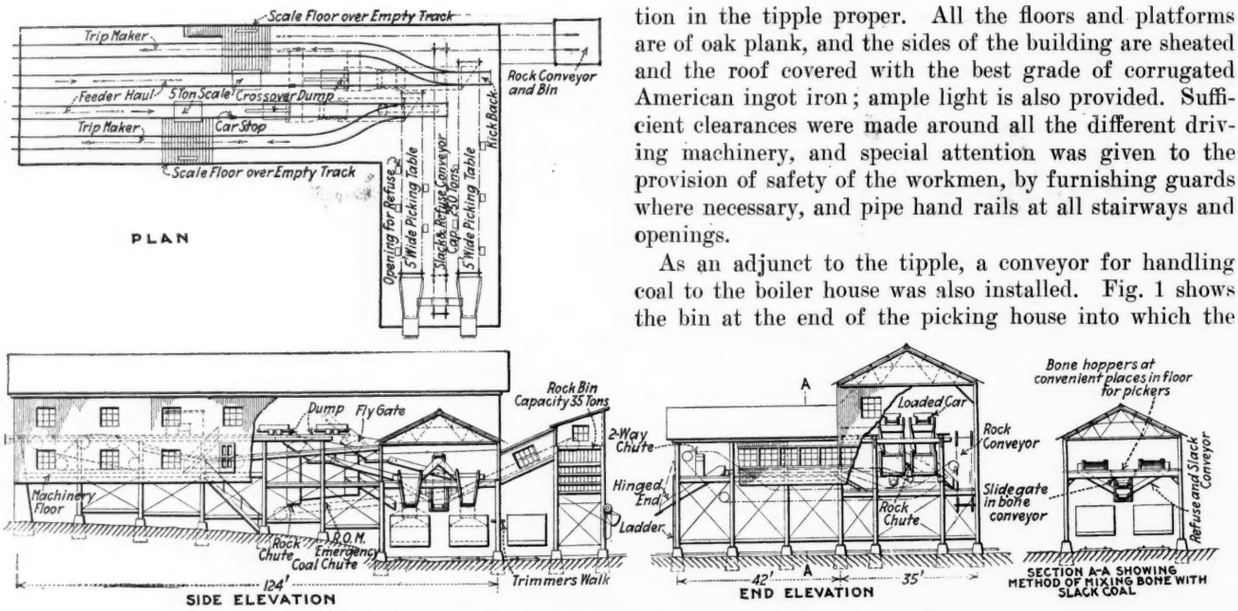


FIG. 6. DIAGRAMMATIC PLAN, ELEVATIONS AND SECTION OF THE TIPPLE

tion in the tipple proper. All the floors and platforms are of oak plank, and the sides of the building are sheated and the roof covered with the best grade of corrugated American ingot iron; ample light is also provided. Sufficient clearances were made around all the different driving machinery, and special attention was given to the provision of safety of the workmen, by furnishing guards where necessary, and pipe hand rails at all stairways and openings.

As an adjunct to the tipple, a conveyor for handling coal to the boiler house was also installed. Fig. 1 shows the bin at the end of the picking house into which the shows two 60-in. picking tables with the bone bins in the center. The conveyor in the center of the two picking tables performs a double function, in that the top run is used for carrying the slack coal from the screens to the head of the picking band, where it is mixed with the picked coal, and loaded as one, into the railroad cars.

The bottom run acts as a refuse conveyor, taking the slate and other refuse delivered to it through the chute alongside the picking tables, and carrying same to the rock conveyor located at the end of the building. The bone coal is stored in hoppers immediately above the top run of the conveyor until such time during the day when no coal is being loaded, when it is also taken by the slack conveyor to a storage bin and then on to the boiler house as described later.

DISPOSAL OF ROCK

The rock being brought out of the mine, along with the coal, the cars are naturally scattered throughout the trip, and to bypass or shunt a car to a rock dump would necessarily cause a delay in the operation of the tipple. Consequently, the rock car is brought along to the Phillips dump, a fly gate is opened in the bottom of the coal-receiving hopper, and the rock is bypassed and fed to a conveyor which takes it to the rock bin located on the outside of the passing track, as shown in Fig. 1. This conveyor is made up of two strands of Link-Belt steel strap roller chain, to which are fastened steel plates, lined with 3-in. plank, thus making a continuous moving apron. Wooden skirt boards, steel lined, form stationary sides throughout the entire length of the conveyor. The machine is electrically operated, the drive being placed at the head of the rock bin. The bin is fitted with a steam-operated Link-Belt under-cut gate (see Fig. 7), which delivers the rock to a larry and takes it to the rock dump.

The tipple is a steel structure throughout, the structural framework being well braced and stiffened to insure sufficient strength and rigidity. Particular attention was given to the design of the shaking-screen supports which are built so as to be entirely independent of any other part of the tipple, thus eliminating practically all vibra-

FIG. 7. ROCK BIN EQUIPPED WITH A STEAM GATE

slack conveyor delivers the bone coal. From here it is fed to a two-roll crusher, the inclined conveyor delivering the crushed coal to the storage bin in the boiler house, from which the stokers are fed.

The tipple was designed and the machinery furnished and erected by the Link-Belt Co., of Philadelphia and Chicago. The work of preparing for the installation for this tipple, and the opening of the new mine was under the direction of E. Dawson Coleman, formerly president of the Ebensburg Coal Co., J. Edgar Long and W. D. Kirk.

Notes on Mine Gas Problems—II

By G. A. Burrell*

SYNOPSIS—Carbon dioxide has a more dampening effect on the acetylene and oil-fed flames than nitrogen. The percentage of blackdamp present can be estimated from the brilliancy of the acetylene flame. An acetylene light in air which will extinguish a candle resembles an oil flame burning in normal air. Afterdamp, taken 1/20 of a second after an explosion, contained 8.15 per cent. of carbon monoxide and 2.75 of uncombined hydrogen. Sparrows cannot be kept in captivity; mice are too sluggish and pigeons not sensitive enough for indicators of carbon monoxide in rescue work. Inhalation of that gas does not have a cumulative effect on canaries. Natural gas is not measurably more dangerous than methane in a mine. The rapidity and uncertainty of its entrance makes its occurrence significant. Hydrogen, ethylene, ethane and carbon monoxide are not emitted by American coals.

The bureau has already called attention to the tenacity with which the acetylene flame resists extinction and to the fact that it will continue to burn in atmospheres in which the ordinary wick-fed flame is extinguished. It was found that a residual atmosphere in which an acetylene flame had been extinguished contained 11.7 per cent. oxygen and 6.30 per cent. carbon dioxide.

It was also found that when about one-half of the carbon dioxide was removed as it was formed, the acetylene flame continued to burn in a slightly greater oxygen deficiency. For this last experiment the flame was placed in a gas-tight cabinet having a capacity of 25 cu.ft. The residual atmosphere after the flame had been extinguished had the following composition:

EXTINCTIVE ATMOSPHERE FOR CARBIDE LAMP

	Sample from Middle of Chamber	Sample from Bottom of Chamber
CO_2	3.22	3.17
O_2	10.99	11.12

The bureau has noted that residual atmospheres containing about 6 per cent. of carbon dioxide, closely resemble those encountered in a mine. Where the oxygen has decreased to 11 per cent., an average of about 6 per cent. of carbon dioxide will be present. An objection has been raised to the use of the acetylene lamp, because it is only extinguished when there is grave danger that the men who are using the light will be asphyxiated by blackdamp.

The acetylene, like other flames, burns less brightly as the proportion of oxygen in mine air diminishes. It was observed at the laboratory of the bureau that when the oxygen content of air decreases to about 16 or 16.5 per cent., the flame somewhat resembles the ordinary wick-fed light when the latter burns in pure air, that is, in air containing 21 per cent. of oxygen. This indication can be used as a guide before venturing into workings filled with blackdamp and containing an even smaller proportion of oxygen.

Effect of Carbon Dioxide on Miners' Oil Lamps

The ordinary miner's lamp is extinguished when the oxygen falls to about 16.5 or 17 per cent. This extinguishment is almost entirely due to the oxygen deficiency and not to the carbon dioxide, since this constituent is rarely ever present in sufficient quantity to exert any appreciable effect when the oxygen in mine air drops to 16 or 17 per cent. When a lighted candle was placed in a bell jar filled with ordinary air it went out when the oxygen percentage fell to 16.24 per cent.

The carbon dioxide produced by the burning amounted to 2.95 per cent. When 3.22 per cent. of carbon dioxide was originally in the air, the atmosphere, after the extinguishment of the flame, contained 16.68 per cent. oxygen. When the atmosphere originally contained 13.52 per cent. carbon dioxide, the flame went out as soon as the oxygen content fell to 17.39 per cent. These analyses are tabulated below.

SOME ATMOSPHERES WHICH WILL EXTINGUISH A CANDLE

Experiment No.	Composition of Atmosphere at Beginning of Experiment		Composition of Atmosphere in Which Flame Went Out	
	CO_2	O_2	CO_2	O_2
1	0.04	21.00	2.95	16.34
2	3.22	21.13	6.51	16.68
3	13.52	20.67	16.00	17.39

A little difficulty, experienced in thoroughly mixing the atmosphere in the vessel, accounts in part for the fact that the carbon dioxide added and that produced by combustion do not exactly check.

It will be observed that the initial presence of a large amount of carbon dioxide had little effect on the flame extinguishment. These flames were extinguished in a still air; in mines, a jerk of the lamp or slight puff of air would snuff out a diminishing flame in an atmosphere containing slightly more oxygen.

Effect of Vitiated Air on the Luminosity of Miners' Lamps

J. S. Haldane† recently made an important contribution to mining literature when he determined the effect of atmospheres deficient in oxygen on the light of a safety lamp. Mine air always contains less oxygen than outside air. This deficiency in the air which is traveling through the mine may vary from 0.10 to 0.20 per cent. or even more, while at advancing faces under ordinary working conditions, the air may be depleted of 2 or more per cent. of oxygen. Doctor Haldane observed that when the oxygen percentage fell to about 19, the illumination of the lamp decreased 73 per cent. and that, roughly speaking, every diminution of 0.10 per cent. in the oxygen caused a decrease of 3.5 per cent. from the value of the light in the pure air.

Afterdamp

Two samples of afterdamp atmospheres are here presented. They are of interest as showing the large amount of carbon monoxide present shortly after an explosion.

Sample No. 1 was collected 30 min. after an explosion had occurred at the experimental mine of the bureau at Bruceton, Penn. It was taken in the main entry where the first right heading is broken off. Ventilation had been restored at that time in the main entry. Sample No. 2 was taken at the face of the first right butt entry, 100 ft. from where sample No. 1 was collected. Ventilation had not been restored in this heading.

*Chemist, Gas Investigations, Bureau of Mines, Pittsburgh, Penn.

Note—Part of an article read at the winter meeting of the West Virginia Coal Mining Institute, Parkersburg, W. Va., Dec. 11, 1912. Continued from Vol. III, p. 104.

†"Colliery Guardian," Oct. 25, 1912.

SOME SAMPLES OF DILUTED AFTERDAMP

	Sample No. 1		Sample No. 2
CO_2	0.26	CO_2	1.54
O_2	20.26	O_2	17.79
CO	0.16	CO	1.89
CH_4	0.12	CH_4	0.65
N_2	79.20	N_2	78.13
	100.00		100.00

Hydrogen was not present in these samples in quantity greater than 0.2 per cent. Samples were not obtained which were large enough to make quantitative tests for sulphurous acid. This constituent is probably mainly responsible for the eye and throat irritation caused by afterdamp. Large samples of such gases are being obtained at the Bruceton mine in order that we may study their composition.

These analyses are instructive as showing that very dangerous atmospheres may exist after an explosion in a mine in close proximity to those wherein men would not soon feel distress. The bureau found that in 0.16 per cent. carbon dioxide, a mouse only shows slight signs of weakness at the end of one hour's time. In the same atmosphere a bird showed signs of distress in 3 min. and fell from its perch in 18 minutes.

In exploring a mine containing afterdamp, a person could, by disregarding the warning of a sensitive animal like a canary, travel in a very short time from an atmosphere which would not distress him into one where collapse would quickly follow.

Automatic Gas Samplers

In order that the chemistry of the explosions in the experimental mine at Bruceton may be better studied, the bureau has lately developed an automatic mine-gas sampler to a stage of completion where it is believed samples of after-gases can be trapped at the time an explosion wave goes by and at prearranged intervals thereafter.

An analysis of a sample collected at the Altofts Experimental Station (England) $^1/_{20}$ of a second after the explosion had passed contained the following constituents:

AFTERDAMP ALMOST UNDILUTED

Gas	Percentage	Gas	Percentage
CO_2	11.25 per cent.	H_2	2.75 per cent.
O_2	1.15 per cent.	CH_4	2.95 per cent.
CO	8.15 per cent.	N_2	73.75 per cent.
			100.00

The high percentage of carbon monoxide will be noticed. The British report calls attention to the presence of oxygen as showing that an inrush of air had taken place even in the short space of time succeeding the explosion. They state that at the instant of the passage of the flame, the oxygen should have been entirely consumed. The gallery at Altofts is above ground, however, and the inrush of pure air would be quicker than in a mine where an explosion had occurred.

Use of Birds for Continued Exploration Work

The bureau has made experiments relating to the use of canaries in continued exploration work, having in mind the fact that the same animal might be used and overcome several times in the same day. It was found that even after they had been repeatedly exposed to carbon monoxide and had as often recovered, upon subsequent exposures they showed distress and collapsed and revived in about the same period of time as on the first exposure. Consequently these animals can be used again and again for all practical purposes, with the knowledge that they will not be less or more sensitive to whitedamp even after repeated exposures. No parallel can be drawn regarding the effects on men of carbon monoxide from these experiments. Men have been months recovering from severe cases of poisoning, and the after-effects have been formidable. To show how differently carbon monoxide affects men and animals, the following experiments performed by the bureau are here tabulated.

PHYSIOLOGIC EFFECTS OF CARBON MONOXIDE

Subject	Quantity of CO used—0.25 per cent. Time Exposed	Distress	Collapse	Recovery
Canary	3 min.	2 min.	3 min.	7 min.
Mouse	12 min.	6 min.	12 min.	25 min.
Man	20 min.	1 hr.	not determined	8 hr.

Whereas the animals were left in the mixture until they collapsed, the man left the atmosphere experiencing but little discomfort at the end of 20 min. One hour later he became very sick.

Use of Sparrows for Recovery Work

The bureau has attempted to use English sparrows for recovery work in mines, but with little success, because those so far obtained have not survived captivity. Pigeons are not sensitive enough, for at the end of 11 min. in an atmosphere containing 0.25 per cent. of carbon monoxide, they showed but slight signs of distress. Mice are more sluggish and not so easily affected as canaries, but they are useful nevertheless. A mouse and a canary together would make a good combination. The usefulness of small animals for detecting bad air in mines has been so well recognized in England that the law requires them to be kept at collieries.

Escape of Natural Gas into Coal Mines

Natural gas has found its way into some coal mines with disastrous consequences. Old abandoned wells are an especial menace in that nobody knows the exact whereabouts of some of them. Natural gases of the Appalachian fields contain other paraffin hydrocarbons than methane, principally ethane. The following analysis shows the composition of the natural gas used at Pittsburgh. This gas is drawn largely from West Virginia, but some comes from western Pennsylvania.

COMPOSITION OF NATURAL GAS AT PITTSBURGH

Gas	Symbol	Percentage
Carbon dioxide	CO_2	trace (less than 0.10 per cent.)
Oxygen	O_2	0.00
Methane	CH_4	82.5 per cent.
Ethane	C_2H_6	16.0 per cent.
Nitrogen	N_2	1.5 per cent.

Carbon monoxide, hydrogen or ethylene are not contained in the gas, not even in traces.

Below are shown the explosive limits of methane-air mixtures, and Pittsburgh natural gas-air mixtures. Ignition was effected by a small electric spark from an induction coil.

LIMITS OF EXPLOSIBILITY OF METHANE AND NATURAL GAS

	Methane	Natural Gas
Low limit	5.50 per cent.	4.92 per cent.
High limit	12.40 per cent.	11.40 per cent.

Below are given the ignition temperatures of methane and ethane, determined by Dixon & Coward[1].

IGNITION TEMPERATURE

Gas	Degrees Centigrade
Methane	650–750
Ethane	520–630

It does not appear from the above that natural gas

[1] "Chemical News," Vol. 99, 1909, p. 139.

is so much more sensitive to inflammation than methane as to produce an added menace from this cause should it escape into a mine. Sudden inrushes of large bodies of inflammable gas have not always been sufficiently controlled to avert disaster. It is also fortunate that carbon monoxide is not present in the gas for its escape into a mine would produce an additional danger. Many published analyses show that natural gas contains this constituent, but the statement is erroneous. Higher paraffin hydrocarbons than methane in natural gas give to the latter its characteristic oily odor.

Inflammable Character of the Gases Present in Mine Air

The bureau has almost ready for publication a report showing the exact character of the inflammable gases present in many samples of mine air. In many textbooks, the statement is made that hydrogen, ethylene and ethane and even carbon monoxide may be present in mine air under normal conditions of operation. As far as the authors of these books are concerned, they are justified because analyses showing these constituents have been reported occasionally.

Because these gases are said to exist in mine air, the question has at times been raised regarding the application to mining conditions of experiments performed in the laboratory or in testing galleries in which methane or the nearly similar natural gas is used. In the report of the bureau, mine-gas samples are listed from about 50 mines, and the methods of examination are described.

It is shown that in no case are any of the gases mentioned present, except in some mines round the oil regions, into which natural gas may have escaped, and as a consequence other paraffin hydrocarbons than methane found. It is also proved that very small errors, which can hardly be avoided in the manipulation of many forms of gas-analyzing apparatus, may result in the reporting of one or more per cent. of combustible gases other than methane. Of course, if a careful analyst reports these gases in even a few samples, then one is justified in suspecting that they may occur in others.

Various Conflicting Definitions of Blackdamp and Firedamp

Blackdamp is still sometimes wrongfully used as if meaning carbon dioxide, instead of a mixture of nitrogen with that gas. Carbon dioxide usually plays but a small part in the combustion effects produced by the mixture. The deficiency of oxygen, which always accompanies excessive proportions of blackdamp, is the main factor in flame extinguishment in mines. On the other hand, any physiological effects produced in men when they are in atmospheres in which lamps do not burn, are largely due to the carbon dioxide. This statement has reference to atmospheres in old workings, etc., and not to those that have been vitiated by mine fires, explosions, etc., and wherein carbon monoxide might exist.

Different meanings have been attributed to the word firedamp. To some it means methane, to others any mixture of methane and air. That other gases than methane may frequently be present is sometimes stated. The writer believes the best definition to be; any inflammable mixture of methane and air. This definition is used by some at present.

Afterdamp

Sufficient data are not at hand to describe completely the constituents present in afterdamp. That the products of incomplete combustion of methane, coal dust and air can be quite complex, is shown by work already performed on single gases and air. This statement has reference to the immediate after-products of an explosion.

After a stagnant mine atmosphere has been clarified of smoke particles and easily condensible gases that irritate, a clear atmosphere can remain for a long time, containing oxygen, carbon dioxide, nitrogen, methane, hydrogen and carbon monoxide. In this atmosphere a lamp may burn fairly well, with no flame indication. Only the characteristic burnt odor will reveal to the senses the fact that there has been an explosion, but the atmosphere may be fatal because of the presence of carbon monoxide.

Largest Mine Hoist in the World

An order, for what is thought to be the largest mine hoist in the world, has been recently placed with the Nordberg Manufacturing Co., Milwaukee, Wis., in competition with both German and English bidders.

The hoist is to be used at the Inverness Railway & Coal Co.'s mine at Inverness, Cape Breton Island, and is of the Nordberg-Corliss, duplex type. The cylinders are 34 and 34x72 in., and the hoist is provided with two drums, each of which is equipped with a Nordberg axial clutch and post brake, enabling independent operation of either.

The hoist is designed for the following service: A train of 12 cars, each weighing 1150 lb., and containing one long ton of coal, must be hauled up a 10,000-ft. incline, which is 16 deg. at the surface and 35 deg. at the bottom. This makes the pull on the rope about 41,000 lb., and in view of this rope stress and the length of cable, this hoist is thought to be the largest ever constructed.

Hoists with larger cylinders have been built for the copper-mining business, notably the two Nordberg hoists at the Tamarack mines in Calumet, Mich., but these are surpassed in the present case in the two particular features mentioned.

As might be expected, the brakes, clutches, reverse and throttle are not operated directly by hand, but by auxiliary engines.

A British Coal Exporter Here

That Wales and the other British coal-producing centers fear an American invasion of their South American trade was evident from the remarks of D. A. Thomas, head of the Cambrian Combination, who is now in New York. He said he expected to remain for a month inspecting coal fields and investigating American methods of mining. His remarks follow:

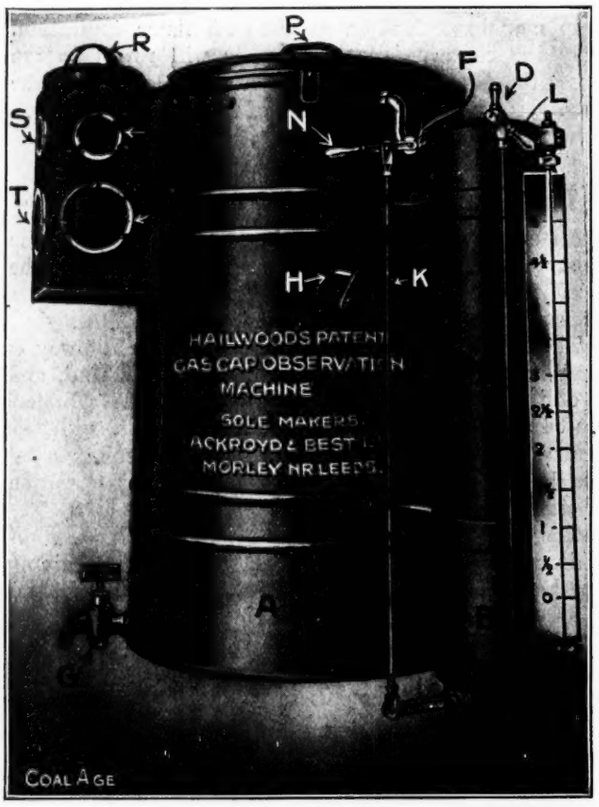
> In South Wales we produce the finest hard coal in the world, but in the cost of production we are not on a level footing with the American companies. In spite of a vast difference in carrying distance the rates in America are so much lower than ours that your coal can be delivered at the sea coast cheaper than we can do it.
>
> These factors have made the Welsh mining interests a bit fearful of their South American trade.

Mr. Thomas said that he might look over some properties with a view to purchasing them.

A New Apparatus for the Observation of Gas Caps

FOREIGN CORRESPONDENCE

Messrs. Ackroyd and Best have just placed on the market a new apparatus for use in the observation of gas caps. This appliance is illustrated herewith. It consists of a large drum marked *A* and at the right-hand side of the same is a measuring drum marked *B* and at the left-hand side, a receptacle for holding almost any kind of lamp. The lamp is placed in a water-ring seal,



AN APPARATUS FOR DETERMINING THE ABILITY OF FIREBOSSES TO DETECT FIREDAMP

so arranged that the pricker wire can be easily operated from the outside.

THE GAS MIXTURE CAN BE REGULATED AT WILL

The appliance is adapted for use with gas from the municipal mains or from high-pressure cylinders. To work the apparatus the bottom tap *C* is opened and the measuring chamber *B* filled with water. A gas tap *D* connected to either the gas service or the cylinder of compressed coal gas, is then opened.

By opening a tap *J* almost all the water is now allowed to pass from the measuring chamber, gas entering and taking its place, a little water up to the level of the zero mark being left at the bottom to form a seal. Tap *E* is then momentarily opened permitting the escape of the surplus gas so that the contents of the measuring chamber are reduced to atmospheric pressure.

Tap *F*, in a pipe which communicates between the upper part of the measuring chamber and drum *A* is then opened. Water is simultaneously allowed to reënter the bottom of the measuring drum *B* through tap *C* till it reaches the desired level, as indicated by marks at the back of the water gage connected to drum *B*. Each division on this scale represents the quantity of gas which, when passed into the chamber (which is normally full of air) adds to it one-half per cent. of gas. Thus to obtain one per cent. of gas in the drum it is only necessary to pass water into the measuring cylinder to cover two divisions of the scale.

THE CARBON DIOXIDE IS REMOVED

To allow an equivalent quantity of air to escape from drum *A*, a tap *G* in the base of same, is opened while gas is being driven into the drum and a handle *H* connected with a large mixer is rotated from time to time to blend the mixture adequately. To absorb the carbonic acid given off by the lamp, a tray of caustic soda or ordinary ground lime may be placed in the drum *A*. The lid of that drum is detachable and is closed by a water seal.

Taps *C* and *F* are coupled together by a rod *K* to ensure their working in unison. It may be mentioned that with this appliance, it is an easy matter to change very rapidly from small percentages up to 5 per cent. (a 5-per cent. cap reaching toward the top of the lamp gauze). It may also be noted that the mixing chamber is of comparatively small capacity. If a mixture containing more than 5 per cent. of gas is desired, it may readily be obtained by refilling the small chamber *B* from the mains or from cylinders and operating the machine as described above.

Working with very low percentages the gas cap would remain steady for 15 or 20 min.; when testing high percentages the cap would remain unchanged for a few minutes; the makers, however, recommend taking an average of not more than five minutes for observations of each percentage of gas. If it be desired that each cap be capable of remaining steady for more than five minutes, larger chambers are made for this purpose.

Greatest Western Coal State

Colorado leads all western states in the production of coal, according to the U. S. Geological Survey, and in 1911 was second only to California in the production of gold. Colorado is also the leading western state in the manufacture of pig iron and of coke and is the leading state in the production of tungsten ores and vanadium minerals. The total value of all mineral products of the state in 1911 was $51,958,239. The following statement shows the values of the principal mineral products in 1911:

Gold	$19,138,800
Coal	14,747,764
Zinc	4,814,562
Silver	3,958,800
Lead	2,755,890

Prof. E. W. Reiss, in an interesting paper on the fossil plants of the coal seams of England, says that the structure of coal-measure plants can be studied in microscopic preparations as effectively as that of recent plants. It is possible to form some idea of the habit of the coal-measure plants by studying their detailed structure. The wide air spaces in the cortical tissues of Calamitean roots have led to the belief that many of the coal-measure plants were rooted under water or in water-logged soil. Some plants were evidently carried by wind and water to that portion of the country where coal is now found. Fragments of marsh and nonaquatic plants are bedded close together in the coal seams.

EDITORIALS

The New Anthracite Mining Code

That the present mining laws under which the anthracite mines of Pennsylvania have been operated and are still governed are badly in need of revision is evident by the interest recently taken, by both operators and miners alike, in the report of the subcommittee to the commission appointed to revise and codify the present law. As previously announced, the commission held an open session for listening to the arguments and suggestions of coal operators, Tuesday, the 14th; and another for the same purpose on Wednesday, when the miners were heard.

It is pleasing to note the tone of conciliation on the part of the operators in their recommendations to the commission. Among those present at the session were: Col. R. A. Phillips, of the Delaware & Lackawanna Coal Co.; C. F. Huber, Lehigh & Wilkes-Barre Coal Co.; W. W. Inglis and Alexander Bryden, Pennsylvania Coal Co.; W. J. Bennett, Philadelphia & Reading Coal Co.; W. L. Allen, Scranton Coal Co., and W. G. Robertson, operator, Scranton, Penn.

The operators presented a hundred-page typewritten statement, containing many valuable suggestions. Prominent among these was the indorsement of the appointive system of choosing mine inspectors, the appointments to be made by the governor. In reference to this matter, the recommendations of the anthracite mine operators read as follows:

> In addition to the comments offered we are of the opinion that, for the benefit of the service, the change from an elective to an appointive system is to the best interest of the commonwealth, the miner and the operator. The further the position is removed from politics the better it will be for all concerned. We go further and suggest that the term of mine inspector should not be less than five years, provided he shall not be guilty of neglect.

The operators favor the acceptance of a certificate of a miner from other countries; and it was even suggested by Colonel Phillips that the provision of the present law requiring a two years' citizenship before a miner could obtain a certificate, should not be made a part of the new code. It was recommended that a board of qualified miners should be appointed to examine candidates for miners' certificates.

The operators favor a mine inspectors' examining board composed of nine citizens, proportioned as follows: Three mining engineers, three mine foremen and three miners; instead of a board of nine members, composed of four mining engineers and five miners, as suggested in the subcommittee's report.

Colonel Phillips addressed the commission at considerable length, and his remarks were well received as coming from one of long experience in the anthracite region. A gratifying feature in the work of the commission is the disposition on the part of the members to hear all parties and to profit, as far as may be, by their suggestions. It is hoped that this attitude of the commission will be rewarded by the codification of a set of mining laws that will meet the growing needs of the coal-mining industry.

Speaking of the rapid growth of electrical equipment in mines, Colonel Phillips suggested the appointment of a board of expert electrical engineers to draft a law covering the use of electricity in the anthracite mines. This is a good suggestion and it is understood, of course, that the electrical engineers so appointed would be only those thoroughly familiar with mining work and conditions in the anthracite mines.

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Mr. Burrell's Address

Inexorable considerations of space compelled us to shorten our remarks relative to Mr. Burrell's address at the West Virginia Coal Mining Institute. The editor has the truly Procrustean habit of cutting us off at lengths to suit the bed in which we must lie. This will be our excuse for displaying our weary, wayworn feet and tattered sandals at the head of this editorial.

We took exception last week to the use of the word "explosion" to cover an inflammation so gentle that, to quote Mr. Burrell: "The flame travels with comparative slowness and can be followed by the eye." It is no wonder that, having entangled himself with such a definition, Mr. Burrell does not agree with us and others who believe an explosion to be both forcible and noisy. No surprise should be expressed that we have placed the low limit of explosibility somewhat higher than he favors.

But we are not disposed to pass on without a threefold commendation of Mr. Burrell. First, he has defined clearly what he means by an explosion. He has not misled people by using a word in an unusual sense without letting his hearers understand what he really means. That practice leading to much obscurity, is only too common in scientific books. Second, he has shown clearly what happens when his "lower limit of explosibility" is reached and when what he terms an "explosion" takes place. Throughout his article, no misunderstanding can arise as to his meaning.

And third, he has called attention to an important point on the scale of inflammability. It specifies a percentage volume at which heat will be generated over a large area, and at which the flame by coming in contact with dust in suspension and with the mine rib is likely to be fed till it may possibly become explosive in a real sense, due to liberated hydrocarbons. We think his so called "lower explosive point" is one, at which, perchance, under natural mine conditions, an explosion might result by reason of added methane, and other gases distilled by the heat of the flame.

E. P. Perman, of University College, Cardiff, Wales, has placed the lower limit of explosibility even lower than Mr. Burrell. To him 2.5 per cent. seems the correct figure, not 5.5, and the higher limit is 24 per cent., which is nearly twice as high as that stated in the address to which we have referred. Such results are so con-

trary to all previous figures that, at first sight, one is prone to regard them as percentages by weight instead of by volume; but the tendency in Great Britain to twist the word "explosion" explains the difficulty.

We do not feel disposed to alter our judgment regarding the canary. That bird may possibly serve the purposes of an indicator of carbon monoxide when helmets are available in sufficient quantities to make exploration work safe and efficient. But where this is not the case, the rescuers will be needlessly delayed in their work by basing their judgment of their powers of safe resistance by so susceptible a bird. In short, the canary unit is too low.

If we assume, with the Bureau of Mines, that the resistance of a canary gives the correct limit for human temerity, then why experiment with a heavy phlegmatic bird like a pigeon. It was to be anticipated that it would have a higher resistance than the bureau desires, without the corresponding advantage of lightness and lack of bulk.

Moreover, we are inclined to believe that it might not show so many intermediate signs between normal conditions and collapse as are afforded by the volatile canary, and further it would possibly be proved that "the resiliency of its nerves," if we may be pardoned for the expression, is unequal to that of the smaller bird. As Mr. Burrell believes that the canary has a power of recovery from afterdamp, as nearly perfect as desired, the pigeon could not be, in that respect, superior.

We are disposed to believe that the test has been prompted largely by the desire to placate those, within and without the bureau, who look upon the use of the canary as undignified. We are not disposed to regard the matter in that foolish light. If the canary is that animal of all animals which will note the moment for retreat or for the donning of helmets, by all means let it be used.

Because this bird is the delight of old maids and other childless women, and is dear to the hearts and replenishing to the pockets of the fortune-telling vagrant, is no reason why it should not serve to defend life. We have no patience with those who have regarded the canary as an unpractical introduction and a useless craze. Our objection has always been that the canary succumbed too easily to make it a correct index on which to base human action.

Mr. Burrell, toward the end of his address, attacked the belief that there were other gases in firedamp beside those given in any of his analyses. This conclusion is extremely interesting, as it shows, for instance, that carbon monoxide is not to be feared as a coal emanation in any of our mines and that ethane is only to be expected where gas leaks in from gas and oil wells.

But we do not believe it is safe for Mr. Burrell to deny, without examination, that such gases may be found in Europe, from which source the condemned analyses arise. In some English mines petroleum has been found, and it is needless to point out some peculiarities in European workings, among which are greater heat and depth, outbursts of carbon dioxide, excessive tendencies toward spontaneous combustion and the presence of coal in a granulated condition.

The surmise of Mr. Burrell may be correct. It is true we are not disposed to clothe analyses made many years ago with the authority of those conducted today, nor do we feel any real assurance that spectroscopic determinations are reliable, at least quantitatively. Nevertheless it is not safe to declare that because firedamp is ethaneless here, it also must be free of that hydrocarbon in the Old World.

Finally, seeing that, quite recently, M. Mahler has declared that carbon monoxide is formed by coal from Anzin, Decazeville, Azincourt and Courrières at moderate temperatures, we are disposed to think that it is unsafe to follow this conclusion of Mr. Burrell till the other side has been heard.

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The Weather Bureau Mine Service

Some prominence is again given to the influence of atmospheric pressure on mine atmospheres, and the relation of the rise and fall of the barometer to mine explosions, in a circular recently issued by the Weather Bureau, at Scranton, Penn. The circular shows a laudable desire on the part of the Weather Bureau to extend their service and make it of some practical value in the operation of mines, with a view to furnish prompt information of a sudden change of barometric pressure, by telephone to the superintendent or other mine official.

It is a well established fact that mine atmospheres often experience a sudden increase in the percentage of gas, owing to the outflow of gas from large abandoned areas or other void cavities, in the mine, where gas has accumulated. This outflow of gas into the mine workings accompanies any considerable drop or fall of the barometer due to a decrease of atmospheric pressure. The effect in the mine is generally felt from 2 to 3 hr. after the fall of the barometer occurs.

Such are the practical difficulties of coal mining, with respect to the ventilation of abandoned areas, that it is impossible often to prevent the accumulation of dangerous quantities of firedamp in these workings. Such abandoned and unventilated areas are a menace to safe mining.

The equipment of most uptodate mines today includes a standard mercurial barometer, and its readings are closely watched and recorded. It is the custom of cautious mine foremen and firebosses to observe the reading of the barometer before entering the mine. The service proposed by the Weather Bureau is a responsible one and will be appreciated by the officials of those mines having no barometer at the shaft.

The circular reads as follows:

Atmospheric Pressure and Mine Explosions

It is an established fact that the pressure of the atmosphere has a direct bearing on the explosions in coal mines, in that while the pressure is high the gas in the mines is confined in pockets and the danger of an explosion is at a minimum; but, when there is a marked fall in pressure (not necessarily, however, to abnormally low pressure) causing the gas to spread from the pockets where it has been confined, the chances of explosion are greatly increased.

I am directed by the chief of the Weather Bureau to ask that you notify this office if you wish this service, and if so, that you kindly forward the name of the person or mine superintendent that should be notified, together with his telephone number, to the end that the necessary protective steps may be taken.

In this connection I wish to say that mine superintendents can obtain readings from the standard barometers in this office, for comparison with the instruments they may have in use for this purpose; also that on application to this office they can have their aneroids set to compare with weather bureau standard barometers.

WILLIAM DUDLEY,
Local forecaster in charge.

Scranton, Penn., Jan. 13, 1913.

SOCIOLOGICAL DEPARTMENT

First Aid to the Injured

By J. H. Young* and J. L. Simons†

Anyone conversant with the history of the medical profession knows that it is a long unbroken record of differences of opinion. The treatments of today are tomorrow replaced by others diametrically opposite. Upon one subject, however, all members of the medical profession agree, viz., the advisability of enlightening the general public as to the best means of alleviating suffering. For diseases and domestic accidents, well known household remedies are still and have been in use for many years.

The Origin of First Aid

Until a comparatively recent date, however, industrial and other accidents have been tended exclusively by members of the medical profession. Although for a long time it was felt that the physician could not be at or near the scene of all accidents, it was not until the Crimean war, in 1854 to 1856, that the first steps were taken in this direction. On Oct. 21, 1854, Florence Nightingale, accompanied by 34 nurses, started from England for the Crimea to organize a nursing department. Her heroic efforts in this struggle mark the beginning of professional nursing and of first-aid-to-the-injured.

In 1861 to 1865, Clara Barton performed a similar service in the American Civil War, and in 1881, in conjunction with Miss Nightingale and others, she organized the International Red Cross, which today heads all nursing and first-aid-to-the-injured movements, not only in America but throughout the civilized countries of the world.

In 1877, the St. John's Ambulance Association, of London, took steps to meet the want felt for aid in industrial accidents and arranged for holding classes in which the pupils were taught the proper methods of aiding the injured, pending the arrival of medical attendance. The movement met with signal success, and during 1877 and 1878, it was extended to include all the important towns of England.

About the same time, similar movements were started in Germany, France, Belgium and Austria. In 1879, the movement spread to Scotland, but the organization of the St. Andrew's Ambulance Association, in Glasgow, in 1882, with precisely the same object in view, removed the necessity for further activity of the English association in Scotland.

The American Movement Delayed 22 Years

Probably the first case of an American movement of this kind, among those employed in industrial pursuits, was the organization of first-aid-to-the-injured corps throughout the anthracite-coal fields of Pennsylvania. Various authorities differ in stating just where the movement originated, some giving the honor to Dr. George Halberstadt, whose endeavors along these lines with the employees of the Philadelphia & Reading Coal & Iron Co. have met with praiseworthy results, and others claim the honor for Dr. M. J. Shields, now first lieutenant, Medical Reserve Corps, United States Army, but at that time affiliated with the Delaware & Hudson Co.

Doctor Halberstadt's and Doctor Shields' movements, although differing in some small ways, are directed toward the same end. To whomsoever this honor belongs, it is an established fact that first-aid-to-the-injured in industrial plants had its beginning in America about 1899. During the past 13 years, its spread has been so great that today it is an institution recognized, not only by the anthracite-coal operators of Pennsylvania, but by the bituminous-coal companies throughout the United States, by railroads, and, in fact, by almost every industry employing large numbers of men.

Case "A," Bandaging of Simple Fracture of Lower Half of Left Leg

Case "B," Method of Supporting a Dislocated Hip

*Physician.
†Fire inspector.
Note—Paper read at the meeting of the Panther Valley Mining Institute, Dec. 7, 1912.

The Burden of Accidents

In Great Britain alone, it has been calculated that 17,000 persons, annually, die from accidents. This, of course, represents a small proportion of those temporarily or permanently disabled. One authority calculates this number in England as 1,500,000 annually.

Lynch and Shields, judging from the incomplete records kept in the United States upon this subject, tell us that 500,000 are so disabled, every year. Accepting the figures of Lynch and Shields, which, it will be seen are low in comparison with those given for Great Britain, and considering the earning capacity of each man injured at a conservative figure of, say, $500 per year, we have an annual loss, to victims and their families, of $250,000,000.

From German statistics, which are carefully compiled, it appears that 57.95 per cent. of all accidents are due to the negligence of employees or employers, and 42.05 per cent. to the inevitable risks of the employed. Lynch and Shields estimate, from such records as are obtainable, that in this country percentages run 66 and 34 per cent., respectively. Upon the subject of inevitable risks, Sir Edward Watkin, M. P., an Englishman who has made an exhaustive study of the subject, says in a small pamphlet entitled "Is Accidental Death Inevitable": "I have at last come to the conclusion that a certain proportion of accidental deaths are as inevitable as the measles. All education in the world will not avail to stop accidents which may end fatally." We conclude therefore, that although the greater number of accidents are caused by negligence of employees and employers, that, even could all accidents from negligence be eliminated, there would still be a small number of unavoidable accidents.

The Importance of Early Assistance

A noted surgical writer has said that the fate of any injured person depends chiefly upon the acts of the rescuer into whose hands he first falls. We are in the habit of saying, when speaking of fires, that the first five minutes are the most important. The same holds good in case of accidents, the difference being that in fires the consideration is property, and in accidents it is human life, which is, undoubtedly, of vastly greater importance.

The value of prompt attendance to injuries was clearly shown during the war with Spain, and in the South African conflict. From statistics dealing with these wars, we find that the loss of life and limb has been reduced to the lowest ratio in the whole history of warfare.

There is nothing more important in the event of accidents than that some one with sufficient coolness and information should assume command and begin to set things right. Such a man will rarely fail to be recognized by those less efficient and will usually find it easy to direct them so that they render valuable assistance, or at least, do no harm to the sufferer.

The last remark brings to our minds the objections advanced by a former division superintendent to the training of first-aid men. His objection was that they would do more harm than good by the over-zealous handling of injured persons; that they would probably poke their dirty fingers into wounds, etc. This cannot happen when men are properly trained. Training is incomplete if the proper handling of wounds is omitted. We do not intend to convert first-aid men into physicians and surgeons. We purpose simply to instruct them as to what they should do and what they should not do, in endeavoring to save life, limb and suffering.

Case "C," Bandaging of Fracture at Base of Skull

Case "X," Dressing a Crushed Right Lower Leg

No Accident Is to Be Regarded as Trivial

The first principle of first aid is to do that which is understood to be helpful; the second, to do nothing which is known to be harmful. Should any doubt arise in the mind of the first-aid man concerning the nature of an injury, he is trained to regard the accident as serious until the patient is placed in the hands of a physician.

"A" was injured by having a timber fall upon his leg, causing a simple fracture of a large bone of the left lower leg. He was allowed to walk three miles across a large city to his home, where a fracture was discovered by the physician. Only good fortune prevented the fracture from being compounded and resulting in a six months' to two years' confinement with possible infection and loss of limb, instead of six weeks of practically painless disability.

"B" sustained dislocation of his hip, 55 miles from home, while working on a railroad. Fellow-workmen failed to recognize the trouble and sat him down on the pilot of an engine and thus moved him 55 miles, causing him untold suffering. Had the injury been recognized, medical attention could have been procured in five minutes.

"C" standing on a freight train entering a tunnel

was struck and was unconscious for 10 min. He was revived and the injury not being recognized by his fellow-workmen, he was allowed to walk unassisted 1½ miles to his home. He fell twice on the way and upon reaching the house fell dead from effects caused by a fracture at the base of the skull, as was discovered in a post-mortem examination. Had the injury been recognized and the proper precautions taken, "C's" life might have been saved.

A man, subject to fits, fell on "D," a four-year old girl, and she sustained a simple fracture of the thigh. She was picked up and carried in cars four miles without a dressing of any kind. The physician was not seen for two hours. Fortunately, the fracture was not compounded, but we can imagine the suffering which she must have endured.

To look at the brighter side, we will now cite three cases where nothing but the presence of mind of the first-aid man saved the patient.

"X," a boy, 15 years of age, fell under a locomotive, having his leg totally crushed to the knee. Prompt application of the tourniquet by first-aid men and proper dressing prevented loss of much blood and made it possible to operate on the patient two hours after the accident.

"Y" was run down by detached cars from a trip and had his arm and shoulder crushed. It was impossible to control bleeding by the tourniquet, but the effusion was stopped by an original dressing devised by a first-aid man, who understood the needs of the case.

"Z" was attacked and beaten by four men, with a tea kettle and stove lid, at his home, and was undoubtedly bleeding to death when a first-aid man passing the house entered, controlled the bleeding, recognized that the skull was fractured and treated the patient accordingly. "Z's" life was saved. The emergency treatment of the case was commended by the surgeon of the hospital.

The accompanying illustrations "A," "B," "C" and "X" show the proper method of dressing injuries like those of victims "A," "B," "C" and "X," respectively, referred to in this article.

Safety Boosting Banquet

On Saturday evening, Jan. 4, the United States Coal & Coke Co., at Gary, W. Va., gave its 3d annual "Safety-boosting" banquet. About two hundred persons were present.

The hall was beautifully decorated with spruce and rhododendron and was brilliantly lighted. The object of the banquet was to discuss the prevention of accidents to employees, and the decorations were arranged to impress this more forcibly upon the minds of all present. On the front of the hall, facing the guests as they entered, the slogan of the company, "Safety the First Consideration," was printed in large letters. The invitations also were decorated with safety gems, such as, "When in doubt, take the safe course," "The prevention of accidents and injuries by all possible means, is a personal duty which everyone owes, not to himself alone, but also to his fellow workmen." Even the cigars which were served bore the brand mark, "Safety First."

For the past several years the United States Coal & Coke Co. has been making special effort to reduce accidents to its employees, and while the management feels that it has not made the progress it should, the figures for the past four years show decided improvement. For the year 1912, the total tons of coal produced per fatal accident inside increased 49 per cent. over the year 1911, 104 per cent. over the year 1910, and 190 per cent. over the year 1909.

Premiums for Safety

In order to give the officials an incentive to be constantly on the lookout for dangers which might be the cause of accidents, the company gives a premium each month to its foremen and assistant foremen, who have a clear accident record, and a special feature of the banquet was the "Foreman's Honor Table," at which were seated 19 foremen and assistants who have a clear accident record of 6 months or longer, some as long as 17 months. These men, after having operated their mine sections for 6 consecutive months without an accident, receive a special premium of from $15 to $25.

Notwithstanding the marked improvement that has already been made in the prevention of accidents, it is the intention of the company to put forth a still greater effort to reduce accidents for the year 1913. Each day during the year there will be mailed to every superintendent, mine foreman and assistant mine foreman of the company a short description of some accident which has occurred during the preceding years, with a statement showing how to avoid similar accidents. This is done so that each foreman and assistant will have the question of accidents brought directly to his attention daily. These reports will also be posted at the mines each day, so that the possible causes of accidents will also be brought to the attention of the workmen as they enter the mines in the morning.

When coffee was served, the following addresses were delivered, with Edward O'Toole, General Superintendent, acting as toastmaster:

"Underground Management of Coal Mines, with a View to Eliminating Accidents to Operatives, in Actual Mining," James Booth, Mine Foreman.

"Underground Management of Coal Mines, with a View to Eliminating Accidents to Operatives in the Transportation Department," J. V. Rhodes, Mine Foreman.

"Underground Management of Coal Mines, with a View to Eliminating Accidents to Operatives from Gas and Dust Explosions," A. H. Hahn, Mine Foreman.

A short talk from the Assistant Mine Foreman's "Honor Table" on "How to Keep a Clear Accident Record," Joseph Andring, Asst. Mine Foreman.

"Inspection of Mines, with a View to Eliminating Accidents to Operatives," W. P. Kearns, Mine Inspector.

"Mining Engineering, Relative to Coal Mines, with a View to Eliminating Accidents to Operatives," H. W. Saunders, Division Engineer.

"Mechanical Engineering, Relative to Coal Mines, with a View to Eliminating Accidents to Operatives," C. H. Williams, Mechanical Engineer.

"Electrical Engineering, Relative to Coal Mines, with a View to Eliminating Accidents to Operatives," Eli Clemens, Chief Electrician.

"Superintending of Coal Mines, with a View to Eliminating Accidents to Operatives," F. A. Kearns, W. W. Harding, A. N. Harris and H. T. Graham, Superintendents.

"Statistics on Accidents," H. N. Eavenson, Chief Engineer.

Leisenring Hall

By Special Correspondent

The H. C. Frick Coke Co. built a hall in the year 1912, at its Leisenring No. 1 plant, near the large swimming pool described in our issue of Oct. 5, 1912, and illustrated on the front cover of that issue. The building, which is to be used for the amusement and recreation of its employees, measures 60x30 ft., with a 42x17-ft. side wing.

It is divided into two stories; the basement is a concrete structure and is used as a game and reading room, having installed therein a bowling alley, pool tables, punching bags and other gymnastic apparatus. This room is also used on certain nights as a reading room and school of instruction and at that time is in charge of a paid instructor.

Opening into this game and reading room is a complete lavatory for men, connected to which is a row of shower baths for the use of employees after athletic exercises. The wing of the building, opening into this room, is divided into two sections, one of which is fitted up for a complete kitchen and contains a cooking range, dishes and other utensils. This kitchen is used, in connection with the basement, as a dining room for suppers and similar entertainments.

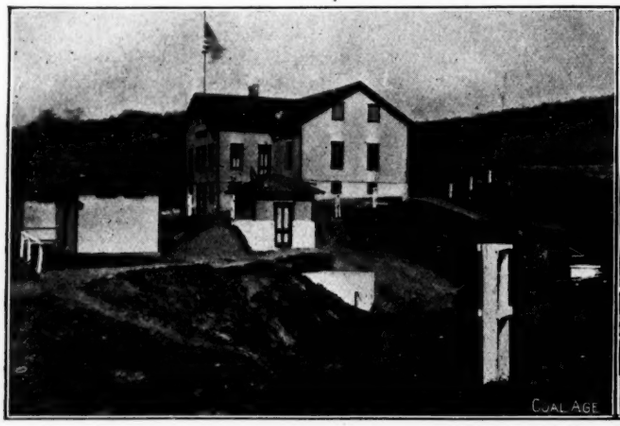
In the other section of the wing is located a large boiler. This furnishes steam for the heating of the building and for the swimming pool adjacent, and supplies hot water to both. The story above the reading room is used for basketball and dancing, being equipped with basketball apparatus and having an alcove fitted with a piano and seats for the orchestra.

As on the first floor, the wing of the second story is divided into two sections, one of which is a complete ladies' toilet and cloak room, the other being used as a barber shop, the proprietor being the custodian of the hall. Though the two floors are connected by a stairway, access to each floor is provided by ladies and gentlemen's outside entrances.

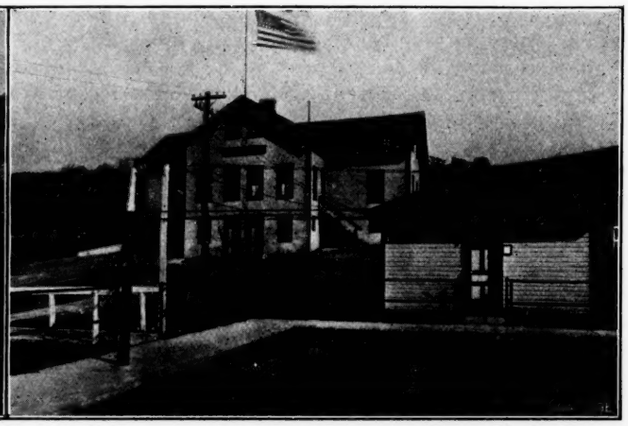
Managed by Employees' Association

The building, which cost the H. C. Frick Coke Co. about $2500, erected, exclusive of material obtained from an old building of this size, has been put in charge of an association formed among the employees and known as the Leisenring Athletic Association. This body is required to equip and maintain the hall from its treasury.

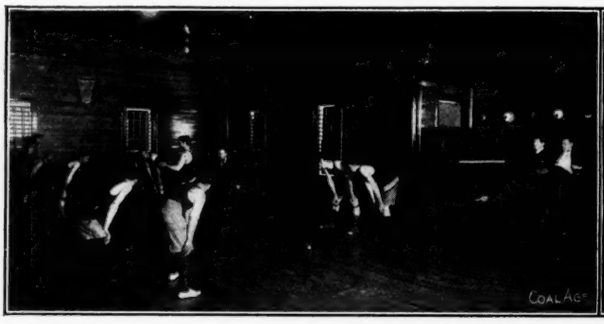
The association membership fee as fixed by the company is $1 with a monthly assessment of 25c. per member. The present membership totals 85 employees, including members of employees' families. The association, however, is not granted the exclusive right to use the hall, all employees of the company, whether members of the association or not, having free right to its advantages and any equipment therein. The membership of the association has rapidly increased since its formation and the society has thus far received and expended about $300, most of which has been used toward the equipment of the hall. It is estimated that it will require an equal amount to complete its outfitting.



Leisenring Hall, Erected by the H. C. Frick Coke Co.



Front View of the Hall from the Swimming Pool



Room for Basket Ball and Dances, Leisenring Hall

Room for Games and Reading in Same Building

No charge is made for admission to dances or basketball games, the only method used for obtaining money being the association membership, assessment fees and money derived from the sale of eatables at suppers and festivals held in this building. The work of the association is under the charge of a president, vice-president, secretary and treasurer, with executive and house committees.

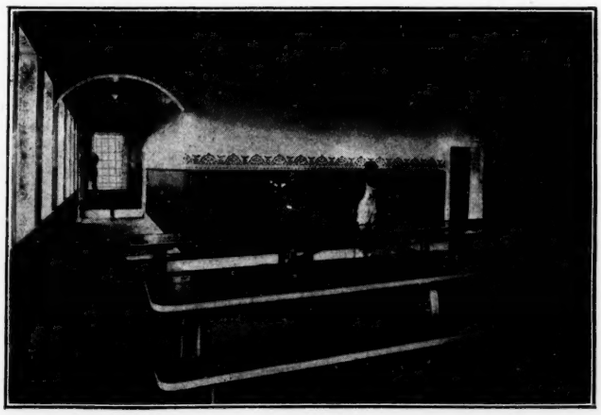
The association has adopted by-laws regulating its own affairs and providing for the proper use of the hall. These relate particularly to the behavior of employees and association members while in the building. The laws are strictly enforced by the officers of the association and the custodian. The hall, which was built as an experiment, has proved a great success and is being used by old and young, men and women, native and foreign born, alike.

Club Room at Prospect Colliery

The Lehigh Valley Coal Co., under the advice of F. M. Chase, its general manager and vice-president, has installed a club house close to the breaker of the Prospect colliery. Hitherto the workers in the breaker have taken their mid-day lunch either in the dust-laden building itself or in or even under box cars. The latter did not form safe places, as it was not certain but that a shifter might at any time put the cars in motion.

EXTERIOR VIEW OF PROSPECT COLLIERY CLUB HOUSE NEAR WILKES-BARRE, PENN.

The building measures 52x56 ft., and is well lighted and ventilated. The walls and ceilings are of cement, and have been prettily decorated by the painters. The dado is painted black, so that the diners will not disfigure the walls by contact with their working clothes.



DINING ROOM FOR EMPLOYEES AT CLUB HOUSE, DECORATED IN BLACK AND WHITE

The walls, however, above this blackened section are white, so that the rooms are light and cheerful.

The chief room of the building is the mess, club or assembly room. It measures 26x56 ft., being well lighted and heated. Benches and tables of varnished hardwood are provided. These are fastened securely to the cement floor and extend the whole length of the building, providing accommodations for about 300 men. This room will be used by the employees when eating their meals, and for conversation, reading and smoking. Appliances are on hand for heating tea and coffee, and fresh running water is on tap at all times.

On the opposite side of the building is the coat and locker room, measuring 20x26 ft. Steel lockers are provided free for each man. The wash room measures 26x27 ft., and

INTERIOR OF MESS OR ASSEMBLY ROOM, SHOWING VISITORS AT LUNCH AS GUESTS OF OFFICIALS

has hot and cold running water. Twenty enameled basins have been installed. A lavatory 8x26 ft., with urinals and closets, takes up the rest of the floor space.

The company will provide janitors free of all cost to the men to look after their club room. But the management of the building will be entirely in the hands of the employees. They will be asked to name their own committees to see that reasonable order is maintained.

Any meeting they may wish to hold may be held in the club room, as the building belongs to them. The extension of the men's club scheme depends on the degree of appreciation shown toward the new plan. If it is successful at the Prospect colliery, more club houses will be built.

While testing Draeger and Meco types of rescue apparatus, it has been discovered that the series of fine wire gages used to prevent the entrance of rust or grit, into the injector nozzle, may possibly become broken, then if small pieces of broken wires, dislodged from the gauze, fall, they may completely stop the passage and cut off the supply of oxygen. This has occurred several times while making tests. The wearer of the apparatus may fall or some other sudden jar or jerk may cause the broken wires to fall, and the man may be rendered unconscious with little or no warning that anything is wrong.

Welfare Work of the H. C. Frick Co.

By Thomas W. Dawson*

Safety, relief, sanitation and welfare, as practiced by the H. C. Frick Coke Co., a subsidiary of the United States Steel Corporation, are so closely associated that I have grouped them under "Welfare," the topic of this paper.

Bureaus of Safety

The United States Steel Corporation has a "bureau of safety" which is intended to assist in coördinating all efforts which are being made among the subsidiary companies for improving the conditions of the employees. It is not only a clearing house for everything of this sort done within the corporation, but it is also an observation station for everything of the kind done by other companies.

It is established to make sure that each subsidiary company knows the best methods adopted everywhere, and also the most successful systems tried by the corporation. The bureaus see that the companies adopt the measures which have been proved to save life.

The Origin of the Expression "Safety First"

"Safety the First Consideration" appears on all letterheads, blank forms, circulars and stationery used at the mine and general offices of the company. This slogan originated with the president of the H. C. Frick Coke Co., which has formulated 25 rules, printed them in pamphlet form, and given a copy in his own language to each workman. The first of these regulations states that:

"Strict compliance with the mining law of the state of Pennsylvania shall be the first duty of each and every employee, at all times, and under all circumstances; and, 'Safety must be the first consideration' of all superintendents, mine foremen and all others exercising authority, or charged with the direction of operations in every department; quality of product, second; and cost of production, third."

Every official and foreman of the company is continually impressed with the fact that safety is to be the first consideration, and all these officials and their subordinates are brought together as one great committee on safety; thus, the strenuous campaign, started several years ago, is being vigorously continued.

The 25 general rules of the company, printed in the various languages of the employees, are posted at conspicuous points about the mine where workmen have the best opportunity to peruse them. Pamphlets setting forth the duties of the miner and the manner in which he may protect himself against danger and giving the safety regulations for those working around machinery have been printed and generally distributed.

The sign significant of danger is the standard sign required by the mining law of the state of Pennsylvania. You will find it at all points in the mine where there is the least possibility of an accident. A similar sign, indicative of the particular danger which may be encountered, is used in and about that part of the plant situated on the surface. These signs are of substantial construction, being made of enameled steel. They have a white background, a red disk in the center, and black letters. Care is exercised to have these in use at all times.

Signs and Locks

When men are working in shafts, the "Men in Shaft" sign is placed so that by no mistake can an accident be caused by the moving of the cages. Where there are explosives, gasoline or inflammable material of any kind, you will see the danger sign indicating the same.

Should a hoisting engineer be repairing or cleaning the machinery in his charge a "Do Not Move" sign is placed at the levers. When workmen are cleaning or making repairs to the inside of a steam boiler, a "Man in the Boiler" sign is displayed. As a further precaution against accident to these men, the steam valve for the particular boiler in which they are working is locked, and one of them carries the key in his pocket, so that steam cannot be turned into the boiler while the men are within the same.

Also when workmen are repairing or cleaning coke-drawing machines, the "Do Not Move" sign is placed on the controller, and as a further precaution those men are instructed to lock the trolley wheel and carry the key until they have finished such repairs or cleaning.

A "No Clearance" sign is conspicuously displayed at all points in and about the plant where there is not clearance for a man between moving cars and buildings, tipples, yard walls and the like. Where tracks approach tipples, bridges or any other overhead obstructions which do not admit of sufficient clearance for a man standing on top of a railroad car, or a teamster sitting on his wagon when passing underneath, bridge guards or overhead warning signs are placed at a sufficient distance from these obstructions, thus giving warning of the danger ahead.

Careless Men Need Not Apply

The man seeking employment observes the sign that unless he is willing to be careful to avoid injury to himself and his fellow workmen, he is not to ask for employment, indicating that the company does not want careless men in their employ.

The sign "Safety First," printed in various languages, is displayed in all the offices, boiler rooms, power buildings, pump rooms and at the mine entrance, reminding the employee that this is to be his foremost thought. A number of these signs are illuminated. They are made of glass on both sides, so that the legend shows in two directions. They are placed at mine entrances, shaft bottoms and in other like places where they will intrude their warning on the attention of the employee and the public.

In the mine, guide signs in the various languages are posted at road junctions, and on traveling ways, indicating the safest way out of the mine.

(*To be continued in an early issue*)

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The January meeting of the Nanticoke Mining Institute was held on Jan. 18, in the auditorium of the Susquehanna Coal Co. Papers were read by David Humphreys on "Mine Ventilation," and by Edward Curtis on "Formation of Coal." During the intervals, music was furnished by a double quartette, with Thomas Lloyd as leader.

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*Assistant chief engineer, H. C. Frick Coke Co., Scottdale, Penn.

Note—Abstract from paper entitled "Welfare, H. C. Frick Coke Co.," read before the winter meeting of the Coal Mining Institute of America, Dec. 18, 1912.

DISCUSSION BY READERS

Reducing Ventilation at Firing Time

Letter No. 2—I first advocated slowing down or stopping the fan at Iowa mines, during shotfiring time, about ten years ago. I did this after giving the matter long and careful consideration in all its bearings and fully realizing my responsibility in the premises. The practice has since become fairly general, in Iowa. Since its adoption, I have not discovered a single case giving the slightest indication that life or property was endangered; but, on the other hand, I believe it has contributed materially to the safety of shotfirers and the protection of property.

I had long been convinced that the presence of strong draft, at firing time, is a greater menace than the presence of dust, and later evidence has so strengthened that conviction that I not only recommended the slowing down or stopping of the fan, but have since requested the complete closing of the intake openings whenever this seemed to me advisable.

The following is an instance. About six years ago an additional air shaft was sunk at No. 6 mine, of the Smoky Hollow Coal Co., in Monroe County, Iowa. The new shaft was located in the midst of live workings, containing considerable narrow work, and was about 1½ miles from the slope mouth and ¾ mile from the fan, which was generally exhausting. A heavy door was built near the bottom of this shaft. To prevent the entrance into the live workings of a strong, cold air current, at firing time, the shotfirers, before commencing their work, closed and locked this door, which was not opened again till all the shots had been fired. It was customary to run the fan at a greatly reduced speed for some time before and during firing time. The only air entering the mine traveled through the main slope a distance of 1½ miles before reaching the working face. Notwithstanding the fact that many of the places were extremely dry, owing to the absorption of moisture by the cold air entering the mine through the new shaft, and windy shots were more or less frequent, no dangerous conditions developed and the shotfirers experienced no difficulty in doing their work.

The matter of reducing ventilation at firing time may be viewed from several angles. In a discussion of this kind, however, the question will naturally be treated largely from a local rather than from a general standpoint. I believe that a broader view should be taken of the matter. It is more important to investigate the reason for a proposed method or system than to discuss the method itself. Mr. McAllister's method of preventing explosions, for instance, may be objectionable under different surroundings, but he seemingly proved its effectiveness in his case and under most trying conditions. Whether or not his method is adopted in any mine, is of less importance to the mining men of this country than that they should know and understand the reasons why it proved a success in that instance.

Experimentally and otherwise, I found that explosions of fine coal occurred only with a rather intense draft, which always seemed to hasten their occurrence and increase the force of the explosion. I found that to produce a dust explosion the draft must be sufficiently intense and concentrated to pick up and carry the dust along to the flame. If this be true, it is evident that, with the fan stopped and no natural draft, the flame of a shot receives no assistance in the production of draft; and there is an increased margin of safety, because a larger flame and one of longer duration would then be required to make an explosion possible.

Mr. McAllister evidently realized the danger of a strong draft at shotfiring time. He stopped the fan and short-circuited the air; and, finding this still insufficient to stop the dangerous draft, he closed the upcast shaft by doors. The results he obtained speak for themselves.

The method of reducing ventilation at firing time will probably never meet with general approval. In mines where the shots are fired by electricity from the surface, the entire stoppage of draft when firing will probably prove the most effective means of preventing an explosion in the mine. But, much good will have been accomplished if the suggestion arouses an appreciation of the dangerous properties of draft, and the realization of the truth that the magnitude of an explosion is measured by the availability of the air supply as much as by the character and amount of the dust present.

JOHN VERNER.

Chariton, Iowa.

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Letter No. 3—The question is: Shall the normal circulation of air, in a mine, be reduced during the time of firing shots? My experience has taught me that a constant supply of fresh air must be kept passing through the entries and workings of a mine, for the following reasons: 1. To remove the four air produced in the operation of a mine. 2. To dilute and render harmless the noxious gases generated in the mine by the combustion of powder and the explosive gases coming from the coal and strata.

No two mines present the same conditions, however, and what would be an ample provision of air in one mine would prove inadequate in many other mines, working under other conditions. The question of the volume of air required in any given mine to render the workings safe and healthful must depend on the local conditions. But, the present discussion has reference particularly to reducing the normal circulation in a mine before firing shots.

While I believe the normal circulation of air should not be reduced at this time, it is also important that the air current should not be too strong, especially at the working face, where the shots are being fired. A strong air current will raise and carry more dust, which is liable to be ignited by the flame of the shots. The quantity of air passing in any district of a mine should be regulated by a competent

mine foreman in accordance with the requirements of the state mining law and the conditions in the mine. It is important, besides, to give strict attention to the cleaning up of the airways and removing the dust from the roads and spraying all dry working places.

My advice is to keep the velocity of the current at the working face normal and not allow this to be reduced when firing. I believe that it is necessary for the protection of the shotfirers, as well as the health and safety of the workmen. It is also important that all shots should be inspected by a competent person before firing, in order to prevent "shooting off the solid," or firing a "dead hole." Either of these practices is liable to cause a windy shot, which is not only dangerous but the frequent cause of mine explosions.

A. T. WADE.

St. Charles, Va.

Letter No. 4—I have read, with great interest, the debate on the reversible fan, in COAL AGE, and consider these discussions very helpful to men interested in mining.

In regard to the question concerning the reduction of air circulation in the mine, during the firing of shots, it seems to me that this will depend entirely on conditions, as some mines are gaseous, while others are free from gas. If I were firing shots in a gaseous mine, I would not, under any circumstances, want the air short-circuited or cut off, or the amount reduced. I should want air enough to dilute the gases sufficiently to make them harmless, and, also, to drive the smoke and gas out of the places where the shots are being fired.

In my experience, I have found that where the air is stopped the gas accumulates quickly, in mines generating firedamp. In such mines, I consider a sluggish ventilation or any stoppage of the fan extremely dangerous.

In a nongaseous mine, where there is a considerable accumulation of explosive dust, I deem it safer to short-circuit the air, so as to reduce the circulation to a low ebb, in the places where shots are being fired. My reason for this is that the firing of shots in a dusty mine will raise the dust; and a strong current of air will hold the dust in the atmosphere for a much longer time than a sluggish circulation. My idea is that a slow current of air will let the dust settle more quickly, and there is less danger of its being ignited, in case of a bad shot.

W. J. TYSON.

Ideal, Colo.

Letter No. 5—An experience of many years as shotfirer in mines, during which time I have closely examined 17 mine explosions and been in the mine when three explosions occurred, has convinced me that air and not coal dust is the prime factor in producing an explosion.

In proof of this claim I would refer to the many disasters that have occurred in model mines of this country and draw attention to the fact that, in the majority of cases, the explosion started in a portion of the mine where the air was at the lowest temperature and had the highest velocity. I acknowledge that at this point in the mine we naturally find the most inflammable coal dust.

In mines where the fan was reversible I have been able to prove the correctness of my conclusions, by changing the direction of the air current so that the section of the mine that gave the most trouble from windy shots was placed on the last of the air instead of being swept by a cold air current fresh from the outside. By this means the number of windy shots was greatly reduced, in every case.

It is customary, in most mines, to run the fan at practically the same velocity the year round; notwithstanding the fact that, in most cases, in the summer season we must overcome the natural ventilation due to the difference between the outside and inside temperature. In the winter season, natural ventilation generally assists the artificial ventilation in a mine, and it is at this time of the year that the most disasters occur.

I have observed, also, that the old mines with poor ventilation are almost devoid of explosions, except where a fan has been installed to increase the ventilation, or a new downcast shaft has been sunk on the inside workings of the mine to furnish more air. In the latter case, the cold air is brought directly into the midst of the blasting section. I consider any system of ventilation faulty where a cold-air current is brought directly into the workings of the mine at a high velocity.

When in the mine, at the time of an explosion, I have always noticed a heavy rush of air behind the explosive wave. In most cases, the ventilating power was overcome and reversed by this rush of air, until the recoil of the explosion took place, when the force would be exerted in the opposite direction.

I have also observed that, as the explosion advanced against the air current, the pressure on the stoppings was greater as the explosive wave approached the downcast shaft. The stoppings are first subjected to a pressure on the intake side, which is directly followed by a reverse pressure on the return side.

A careful study led me to believe that if the inrush of air behind an explosion could be prevented, a vacuum would be formed there that would soon develop a greater power than that of the explosive wave and arrest its advance. It was this that led me to build doors folding down on the top of the upcast shaft, and which were to be closed during firing time. I have referred to this in a previous letter. Following up my theory, I have endeavored, at different times, to produce an explosion under the conditions explained, but have failed.

In summing up, let me say we all agree that coal dust will explode when intimately mixed with air and subjected to a flame of high temperature. Cold air contains more oxygen per unit of volume than warm air, owing to its greater density, and this tends to increase the temperature of the flame of a blast of powder. The temperature of the flame is further increased by the additional amount of air passing, which carries the most inflammable coal dust stirred up by the firing of the shots. This causes a constantly increasing explosive condition of the air and, being acted on by the flame of succeeding shots, furnishes the combination necessary to start an explosion.

By closing the doors over the upcast shaft and short-circuiting what air is passing, we practically destroy the life-giving property of the flame—the strong air current—and reduce the temperature incident to blasting. My argument is, briefly, as follows: Should an explosion start in a mine, it will advance toward the intake opening, and the closed doors above the upcast cause a vacuum to form behind the explosion, which will soon develop force sufficient to arrest the same.

ALEXANDER MCALLISTER.

Croweburg, Kan.

Coal Mining in Oil and Gas Fields

Some time ago a correspondent referred, in these columns (COAL AGE, June 29, 1912, p. 1255), to the danger arising from gas wells in coal fields. The danger mentioned is not confined to gas wells, but is common also to oil borings.

Coal, oil and gas are great natural resources. Coal must be mined; oil and gas must be produced in quantities to meet the ever-growing demands of communities. In West Virginia these industries are developing rapidly and must eventually come into serious conflict with one another. The same condition, no doubt, exists in other states. This situation given rise to many discussions, and considerable has been written on the subject; but much remains to be done before the problem can be solved and the best and safest ways to adopt rightly determined.

Coal and mineral publications, mining institutes, the U. S. Bureau of Mines and in fact, all mining men should discuss and take steps to prevent, as far as possible, catastrophes that may prove worse than even the Monongah, Marianna, or Darr explosions.

An old, abandoned well, whose location has been covered and forgotten is a menace to mining—a great, hidden danger. As has been illustrated at the Enterprise and Middleton mines, in West Virginia, and at a small country bank near Peora, W. Va., a mine may be blown up before actually cutting into such a well. The question of who is, or who should be liable for accidents of this nature may be hard to answer at the present time and under present conditions and laws.

While every uptodate mine manager strives to insure the protection of his property and the safety of his employees, and to produce a large tonnage at a low cost and recover the greatest possible amount of coal per acre mined; an unlooked for explosion may result from the mere proximity to a hidden gas well and upset the most complete plans that an efficient and capable organization could outline.

Several of the large and responsible oil-and-gas companies now realize the seriousness of the situation and consult quite generally with the coal companies affected relative to the location of proposed wells. The oil-and-gas companies will cement around the casing when the well is drilled through a coal seam. There are, however, at the present time, some companies who locate and proceed to drill their wells without making any attempt to insure the safety of the men who some day will mine coal in the vicinity of these wells.

Coal companies operating in an oil or gas field should be compelled to leave a solid block of coal around all wells whose location should be plainly marked on the mine map.

The size of such block of coal will depend on the character, inclination and thickness of the overlying strata, and other conditions relating to the mining of the coal. Many different opinions are advanced by mining men and men in the oil-and-gas business as to who is responsible for the loss of coal left unmined and the accidents that may result from gas finding its way into the mine from the well; and it is pretty hard to determine just what law of equity should be made. Many old drill men claim that cementing a well is not effective, and many field bosses say that uncovering a gas line, under which the mine pillars are being drawn, does little good, but most mining engineers take the opposite view.

In the writer's opinion, a dry hole bored for oil or gas in a producing field, should be considered and treated the same as a producing well. No wells should be allowed to be drilled through the squeezed or abandoned section of a mine. All oil-and-gas companies should be compelled by law, to protect adjacent mines, from gas issuing from their wells, and to file with the state Department of Mines and the coal companies alike maps showing the correct location of all wells drilled in a coal field. The maps should show all oil and gas lines laid in that district. The coal companies should also place all such locations on their mine maps. Nitroglycerin magazines should never be erected over mine workings where the covering is light.

MINING ENGINEER.

Clarksburg, W. Va.

The Price of Coal

For some time past I have wanted to comment on the Foreword in COAL AGE, Aug. 3, 1912, by the president of an Ohio coal corporation, followed by your footnote, referring to the subject of the poor returns on capital invested, received by those engaged in the production of coal. I would have written sooner, but for the pressure of other work, which prevented.

It seems strange that those who invest their labor and capital in the extraction of a mineral, a ton of which, it is safe to assume, can be made to earn $500, are scarcely able to realize a dollar on their investment. The question arises: Why is this; what is the reason?

An article in the *Technical World Magazine*, March, 1912, by George H. Cushing, gives some interesting facts and figures about buying and selling coal. He states that he buys his coal through a purchasing agent for a certain large consumer, who buys 3000 tons a day. He quotes the agent as saying that if ever the time comes when the price of coal equals or exceeds the cost of production, his company would start to operate mines of their own; adding, if there is any profit in the coal business, our stockholders want it, as we own coal lands that will last for the next 100 years.

Another large industry in Chicago owns 14,000 acres of coal land in Kentucky and 20,000 acres in West Virginia. Another Pittsburgh corporation owns practically all of the Connellsville field of Pennsylvania and has something like 200,000 acres of coal in southern Illinois. Every coal-carrying road holds a large acreage of virgin coal land, or controls the principal coal-producing companies on its lines.

This, it seems to me, is the key to the whole situation. What enables railroads and other large consumers of coal to dictate the price they pay for fuel is the private ownership of land for which they pay only a nominal tax and interest on the investment. If these coal lands were assessed at their true value, the power of these corporations to dictate the price of coal would be broken. This would seem to be the only remedy.

By the use of improved machinery or by changing the plan of working the mine, it is possible to reduce operating expenses; but the benefit, at the most, is only temporary, as sooner or later, the advantage is absorbed by the large consumers.

SPECIAL CORRESPONDENT.

Chicago, Ill.

INQUIRIES OF GENERAL INTEREST

Coal Required to Heat Water

How many pounds of bituminous coal would be required to raise the temperature of water from 45 deg. F. to 112 deg. F.; the quantity of water used being 3000 gal. per hour?

MINE SUPERINTENDENT.

Clearfield, Penn.

The weight of water used per hour is

$$\frac{3000 \times 231}{1728} \times 62.5 = 25{,}065 \text{ lb.}$$

The quantity of heat required to raise 1 lb. of water 1 deg. F. is called one British thermal unit (B.t.u.). The rise in temperature, in this case, is 112 — 45 = 67 deg. F. Therefore, the quantity of heat required to raise the given weight of water from 45 deg. to 112 deg. F., is

$$25{,}065 \times 67 = 1{,}679{,}355 \text{ B.t.u.}$$

Now, assuming 1 lb. of bituminous coal has a heating value of 14,000 B.t.u., the weight of coal required per hour is

$$\frac{1{,}679{,}355}{14{,}000} = \text{say } 120 \text{ lb. per hr.}$$

This assumes that all the heat of the coal passes into the water, which is never the case in practice. The efficiency of the heating system will depend upon the arrangement and construction. It may be assumed that the coal burned in heating the water has an efficiency of 7 per cent., if burned under a boiler. Taking the efficiency as 6 per cent., the weight of coal burned per hour would be 120 ÷ 0.06 = 2000 lb. or 1 ton per hour.

❖

Pumping from Different Elevations in a Shaft or Slope

Referring to COAL AGE, Feb. 10, 1912, p. 586, it is stated, in answer to the second letter of correspondent, that it would be advisable to connect the upper sump to the suction line of the pump at the lower elevation, since by so doing the head of water due to the elevation of the upper basin above the pump becomes available to assist the pump in draining that basin.

The argument apparently is that the water from the upper sump would pass through the pump under a pressure due to the elevation of the upper sump above the pump, and this pressure would balance the corresponding head in the column or discharge pipe, whereby the water from the upper sump would be discharged to the surface as economically as if the pump were located at the upper basin.

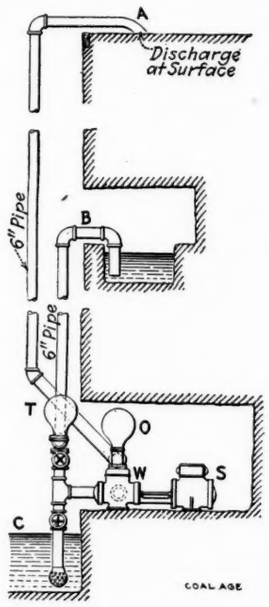
I wish to ask what effect this system would have on a reciprocating pump, as to the action of the suction valves under this pressure; and whether or not the springs controlling the valves would have to be strengthened in order to have the pump work as efficiently as when taking its water under ordinary conditions. If possible, kindly give a reference, in this regard, from someone who has a pump working under similar conditions.

M. J. BRACKEN,
Gen'l Supt., Mountain Coal Company.

Gallitzin, Penn.

The inquiry answered in COAL AGE, to which our correspondent refers, related to pumping from two different elevations, in a slope. The principle is the same whether pumping in a shaft or a slope.

The accompanying figure shows the mine pump located at the lower basin *C*, the column pipe *BC* draining the upper sump, and the discharge pipe *CA* reaching to the surface. As stated in our previous answer, there should be provided two valves, one above and the other below the point where the pipe leading from the upper basin enters the suction pipe of the pump. These valves are shown in the figure. When pumping from the lower basin, the upper valve is closed and the lower valve opened. When pumping from the upper basin, this order is reversed; the lower valve is closed and the upper one opened.



SHOWING ARRANGEMENT OF PUMP AND COLUMN PIPES

No difficulty will be experienced, owing to the pressure on the pump valves, provided the arrangement is such as to avoid a water-hammer in the pipes. This can only be prevented by placing an air chamber at the foot of the pipe conducting the water from the upper basin to the pump. In the figure, *S* is the steam end and *W* the water end of the pump. The usual air chamber *O* is placed on the water end of the pump to prevent water-hammer in the discharge pipe, by maintaining a continuous flow of water in that pipe. A similar air chamber *T* is shown at the foot of the pipe leading from the upper basin to the pump. This air chamber is connected to that pipe just above the valve, and prevents water-hammer in the pipe by maintaining a more or less continuous flow of water from the upper basin to the pump.

William Schwanhausser, chief engineer of the International Pump Co., 115 Broadway, New York City, is authority for the statement that a pump thus arranged will work without difficulty under a pressure due to a head of water on the suction end. In such an arrangement, the only factor to be considered is the inertia of the water columns, which is more or less perfectly overcome by the air chambers connected with the column pipes.

EXAMINATION QUESTIONS

Mine Foremen's Questions

(Answered by Request)

Ques.—(a) What is the angle of inclination and the percentage of grade of a slope that dips 8 in. per yd.? (b) If the slope is 1000 ft. long, measured on the incline, what is its length measured on a map drawn to a scale of 100 ft. per inch?

Ans.—(a) Since there are 36 in. in a yard, the slope dips 8 in 36. Then, calling the angle of inclination of the slope A

$$\tan A = \frac{8}{36} = 0.2222$$

$$A = 12^\circ\ 31'$$

The percentage of grade is found by multiplying the tangent of the angle of inclination by 100. Thus,

Percentage of grade $= 0.2222 \times 100 = 22.22$ *per cent.*

(b) All measurements on a mine map are horizontal distances. The horizontal distance corresponding to 1000 ft. slope measurement is found by multiplying the distance measured on the incline by the cosine of the angle of inclination. Thus,

Horz. Dist. $= 1000 \times$ *cos* $12^\circ\ 31' = 1000 \times 0.9762 =$ 976.2 *ft.*

For a scale of 100 ft. per in., the distance measured on a map drawn to a scale of 100 ft. per inch, is then, 976.2 ÷ 100 = 9.762 in., or slightly more than 9¾ in.

Ques.—A cross-heading turned off the main entry is driven due north for a distance of 150 ft., and dips 4 ft. in this distance. The coal seam rises due west 1 ft. in 6 ft. How far east or west from the center of the cross-heading will the line of strike, passing through the face of the heading, cross the main entry?

Ans.—The cross-heading, from the entry to the face, dips 4 ft. Since the seam rises 1 ft. in 6 ft., going due west, the dip of the seam is 1 ft. in 6 ft. due east. The main entry will, therefore, dip 4 ft. in going 4 × 6 = 24 ft.; and the line of strike passing through the face of the heading will cross the main entry 24 ft. east of the mouth of the cross-heading.

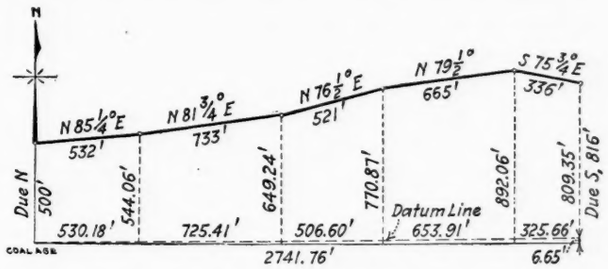
Ques.—(a) How many acres are there in the following described piece of land: Commencing at the southwest corner of the northwest quarter of section 25; thence, due N, 500 ft.; thence, N 85¼ deg. E, 532 ft.; thence, N 81¾ deg. E, 733 ft.; thence, N 76½ deg. E, 521 ft.; thence, N 79½ deg. E, 665 ft.; thence, S 75¾ deg. E, 336 ft.; thence, due S, 816 ft.; thence, westerly to the place of beginning.

(b) If the average thickness of the coal seam is 4 ft. 6 in., how many tons of lump coal can be mined from this tract, allowing 27 cu.ft. of coal, in place, per ton and 20 per cent. waste and 30 per cent. fine coal?

Ans.—(a) The accompanying figure is a plat of this survey. As shown in the figure, the closing course runs west 2741.76 ft., bearing north in this distance, 6.65 ft. The following is the traverse of the survey, showing the *northings, southings, eastings and westings of the several courses, except the closing course.

Bearing	Distance	N.	S	E	W
Due N.	500	500.0	.....	.....	.....
N 85 ¼ E.	532	44.06	.....	530.18	.....
N 81 ¾ E.	733	105.18	.....	725.41	.....
N 76 ½ E.	521	121.63	.....	506.60	.....
N 79 ½ E.	665	121.19	.....	653.91	.....
S 75 ¾ E.	336	.....	82.71	325.66	.....
Due S.	816	.....	816.00	.....	.....
		892.06	898.71	2741.76	
			892.06		
			6.65		

An east and west line through the first station is taken as datum and the total northing of each station, above datum, is calculated by adding the northing of each consecutive course to the total northing of the previous station. The total northing of each station, as thus calculated, is shown on the diagram. The entire area of this survey is thus divided into five trapezoids and one triangle. The area of each of these trapezoids and that of the triangle is then calculated as follows:



PLAT OF SURVEY

	square feet
$\frac{500+544.06}{2} \times 530.18 =$	276,769
$\frac{544.06+649.24}{2} \times 725.41 =$	432,815
$\frac{649.24+770.87}{2} \times 506.6 =$	359,713
$\frac{770.87+892.06}{2} \times 653.91 =$	543,703
$\frac{892.06+809.35}{2} \times 325.66 =$	277,040
$\frac{2741.76}{2} \times 6.65 =$	9,116
Total area.....	1,899,156

The acreage in the inclosed survey is then 1,899,156 ÷ 43,560 = 43.6 acres.

(b) Allowing 27 cu.ft. per ton of coal in place, and deducting 20 per cent. and 30 per cent., respectively, for waste and fine coal, leaving 50 per cent. for lump coal mined, the total tonnage that can be mined from this tract of land, the seam being 4 ft. 6 in. thick, is:

$$\frac{1,899,156 \times 4.5}{27} \times \frac{1}{2} = 158,263 \text{ tons}$$

* The northing or southing of any course is called the latitude of the course, and is calculated by multiplying the length of the course by the cosine of its bearing. The easting or westing of a course is called the departure of the course, and is calculated by multiplying the length of the course by the sine of the angle of the bearing. A course running due north or due south has no departure, and the length of the course is its latitude (northing or southing.)

COAL AND COKE NEWS

Washington, D. C.

It is now understood that Attorney General Wickersham has decided to make a further attack on the so called Hard Coal Trust, by attempting to break up the minor combinations of coal-carrying railroads and coal companies in the Pennsylvania fields, charges against which were dismissed by the Supreme Court without prejudice in its recent decision, because they were held to have been improperly incorporated in the Government's original general bill against the trust.

The work will be in charge of James C. McReynolds, of New York City, who was the Government's counsel in the anthracite trust suit. The attorney-general's idea is to get Mr. McReynolds to clear up the whole situation so far as possible by the proceding which is now contemplated. Mr. McReynolds reported to the attorney-general last week concerning the result of several weeks of study of the general situation and it is understood that he urged that the department go ahead.

The minor combinations not passed upon by the Supreme Court, but left for future consideration and possible action, were those said to have been created in 1898 by the absorption of the New York, Susquehanna & Western by the Erie; in 1901, by the acquisition by the Reading Co., which owned the Philadelphia & Reading Ry., and a coal company of similar name, of the Central Railway of New Jersey with its coal companies; in 1899, by the acquisition by the Erie of the Pennsylvania Coal Co., which is said to have been projecting a new railroad, the Delaware Valley & Kingston.

It is stated that negotiations between the Department of Justice and these concerns are under way looking for a settlement.

Alaska Coal for Testing

Eighty-eight dollars a ton for coal is the rate just paid by the Navy Department for 855 tons, and the department hopes and believes that the money has been well spent. This particular purchase of coal is in the nature of a venture and it is not likely that the Government will buy much more at the same price. But if the venture turns out well it may mean that the United States will be provided with a sufficient amount of coal to supply the entire navy for a long period of years.

The Naval appropriation bill last year contained $75,000 for the development of Alaskan coals. The only way the department could determine the efficiency of this fuel was to get a sufficient quantity of it aboard a ship and actually burn it. Alaska coal has never been brought to market. Billions of tons of it are known to exist, but as yet no means of bringing this fuel within reach of the people have been provided.

The Navy Department was instructed to determine whether there was in Alaska a coal deposit containing fuel in sufficiently large quantities and of proper quality to be regarded as a source of supply for our warships. After Congress granted the $75,000 the Department turned the technical operation of its expedition in search of coal over to the Bureau of Mines, of the Department of the Interior. It was planned to take out about 900 tons of coal from the Bering River district.

The Matanuska field is much further removed from the sea than the Bering River field. The Navy Department is not attempting to solve the Alaskan problem in its present work, but is only concerned in getting out to the seacoast a sufficient quantity to be tested. If it proves satisfactory, a better means of transportation will be devised.

Another Foreign Coal Contract

Strong interest is expressed here in the fact that the Pocahontas Fuel Co. is understood to have made arrangements by which it will furnish coal to the Austrian-Hungarian navy for several months to come. This firm already has the exclusive contract with the Isthmian Canal Commission, shipping about 500,000 tons to Panama per year and is the largest contractor for the coal used by the United States Navy.

Although the State Department is disposed to claim some merit for the progress that American coal has been making of late in the Mediterranean market it would seem that the only reason for this recent success is the high price of Welsh coal which has given American shippers the advantage.

Secretary of the Interior, Walter L. Fisher, has written a long letter to the Senate Committee on Indian affairs concerning the resolution extending the time for the appraisement of the coal lands of the Indians in Oklahoma The measure has been favorably reported to the Senate. Secretary Fisher says in part:

To work out this problem in justice to the owners of the land (the Choctaw and Chickasaw Nations), as well as the persons claiming to be owners of the improvements, I have provided in the proposed resolution that any person claiming payment for improvements must file his claim under oath within 60 days from the date of the approval of the act with the Secretary of the Interior or his authorized representative, and that if no person shall so assert a claim to the improvements on any tract, such improvements shall be sold as a part of the land.

As a conclusive rule of evidence, I also suggest that if a claim be filed by or on behalf of any person within the time allowed, and no adverse claim be filed within such time, the improvements shall be deemed to be the sole property of the person applying therefor.

It is also recommended that where there is no controversy, improvements be sold and the purchase price, except 5 per cent. to cover expenses, be paid immediately to the owner of the improvements; but that in case two or more persons claim the improvements, and one of them is a successful bidder therefor, the sale be conducted as in the case of purchases by strangers, and the proceeds deposited to the credit of the tribes, subject, however, to withdrawal on order of the Secretary of the Interior for payment to the true owner in the event that the right of ownership shall be finally established by a court of competent jurisdiction.

WILKES-BARRE, PENN.

During the year 1912, the working time for the collieries in and near Plymouth was much less than during the preceding year, due principally to the suspension which began April 1, and continued until May 23. The Avondale colliery, of the D., L. & W. Co., made the best record, showing an increase of 160 days and two hours. This mine was idle 11 months during 1911 on account of a squeeze, which almost flooded the mine.

It is expected the breaker at No. 2 D. & H. Colliery will be torn down during the present year and the coal taken out through No. 5 of the same company. Of 12 collieries whose time was examined for the year, seven worked much less time last year than in 1911. The Nottingham and Lance, of the L. & W. B. C. Co., show a net decrease of 15 days and four hours; Nos. 2, 3 and 5, of the D. & H. Co., a net decrease of 129 days and six hours; Buttonwood and Parrish, of the Parrish Coal Co., an increase of 73 days, 3½ hours; Woodward and Avondale, of the D., L. & W. Coal Co., an increase of 198 days and two hours; Gaylord and Gaylord Washery, of the Kingston Coal Co., a net decrease of 23 days; Chauncey, of the George F. Lee Coal Co., a loss of 19 days; and the Dodson, of the Plymouth Coal Co., a decrease of 128 days and seven hours. Part of this loss in the case of the Dodson, however, was caused by the fire in the Red Ash vein, which laid the mine idle from Dec. 12 to the end of the year.

PENNSYLVANIA

Anthracite

Wilkes-Barre—About 3000 employees of the Henry and Prospect Collieries of the Lehigh Valley Coal Co. went on strike, Jan. 17, because 600 workmen at the mines refused to join the union.

On Jan. 1, it was shown that several men had refused to comply with the demands of the unionists, and a canvass was made of the colliery, following which the men decided to strike. The men, however, returned to work the next morning, and appointed a committee to confer with the colliery and company officials.

Bituminous

Butler—The miners at the Cunningham coal mine went on strike recently, but enough men were found so that the mine did not lose much time.

Connellsville—Baltimore, Philadelphia, Atlanta and Toledo capitalists recently inspected the mines of the Buffalo Creek Coal & Coke Co., in Logan County, West Virginia. The company owns 6600 acres of coal and operates five openings, with a daily output of 1500 tons.

Kittanning—The bridge of the Pittsburg, Shawmut & Northern R.R. which crosses the Allegheny River about 7½ miles above Kittanning, was washed out on Jan. 8. This cuts off all connection between the mines of the Allegheny River Mining Co. on the west bank of the Allegheny with the main line of the railroad. The bridge was only partially completed when the flood came. The center span of the bridge was 400 ft. long.

Pittsburgh—An expenditure of $500,000 for the buildings of the Bureau of Mines, located in this city, is proposed by Congress. A bill appropriating $300,000 has been presented in the House.

The buildings are to occupy the new Magee site, near the University of Pittsburgh. This site is being transferred to the Government in exchange for the Arsenal property, in Lawrenceville.

WEST VIRGINIA

Moundsville—It was expected that the Panama mine, operated by the Ben Franklin Coal Co., would resume work Jan. 13. The high water still covers the low ground about the mine. It is said that the company has considerable work to do on the new machinery, which has just been placed at the mine. The management is taking advantage of the shutdown to get this work done.

The Fort Pitt mine, across the river, which closed down on account of the proximity of the water to the airshaft, was expected to resume work at the same time.

KENTUCKY

Louisville—During the past week the 40-ft. stage of the Ohio River at Louisville has caused considerable embarrassment to the Monongahela River Consolidated Coal & Coke Co. For several days the offices have been accessible only by means of skiffs, and deliveries have been, of course, impossible. In view of the weather, however, which has kept the domestic demand down to the absolutely irreducible minimum, the inconvenience has not been great.

OHIO

Columbus—Columbus shippers are very much interested in the recent ruling of the Interstate Commerce Commission establishing a rate of $1 from the Thacker and Konova fields of West Virginia to destinations in Ohio. This means that there will be competition against Ohio coal for domestic consumption in Ohio.

The 50,000 miners in the Buckeye State through the state organization will petition the Ohio General Assembly to appropriate $10,000 for the purchase and equipment of a mine rescue car modeled after the Federal car. The state mine department has safety appliances, and it is proposed to install them on the car.

INDIANA

Diamond—The McClellan coal mine No. 9, which has been in operation with fair production for the past 12 years, will be discontinued within a few days on account of excessive water, defective pipes, machinery, etc. Pillars, tools and machinery are now being removed.

The last of this month the Zellar mine No. 5, which has been running night and day, will also discontinue. With the closing of these mines a great many miners will move their families to Bunsen and West Terre Haute, where extensive collieries are being built.

Clinton—Six mines in this field resumed work, Jan. 16, following a shutdown of a week. The cause of the strike was an assessment of $1, which was levied on each man who remained away from work because the miners' train was late. The mines involved were the two Miami mines, the Jackson Hill mine and the Dering mines Nos. 5, 6 and 8. All are located on the south switch of the Chicago & Eastern Illinois R.R. The grievance is to be taken up, through the district officers.

Indianapolis—A bill to legalize the taxation of minerals in Indiana has been introduced in the state legislature by C. H. Bedwell, representative from Sullivan County. The bill was introduced because of a recent ruling of the Indiana Appellate Court that mineral is not taxable. The passage of such a measure will mean thousands of dollars annually to the coal counties of the state of Indiana.

Bills have also been introduced for the weekly payment of miners and the separation of coal inlaid and apart from real estate for assessment and taxation.

ILLINOIS

Peoria—On Jan. 16, three men were killed by a premature explosion in the Crescent coal mine, six miles west of Peoria. The explosion let down tons of earth and débris upon the men. Their bodies have been recovered.

PERSONALS

Walter Finley has resigned as general manager of the R. O. Campbell Coal Co., which operates several mines in the Eastern Tennessee field.

O. L. Stearnes has been elected president of the Tri-State Power & Milling Co. Mr. Stearnes is also a promoter of the Appalachian Power Co., of Virginia.

Governor McCreary, of Kentucky, has appointed Henry S. Sizemore, of Hopkins County, assistant state mine inspector, succeeding W. B. Brasher, who recently died.

C. J. Johnson, of Electon, Ala., has resigned his position as assistant superintendent of the Blocton Coal Mine Division of the Tennessee Coal, Iron & R.R. Co. His successor has not been appointed.

Neil McHugh, foreman at the Courtdale Colliery of the Kingston Coal Co., has been made superintendent at the Hadleigh Colliery of the Pittston Coal Co. at Sugar Notch. His successor has not yet been named by the Kingston Coal Co.

Andy Beveridge has resigned his position with the Western Coal Mining Co., with whom he has been connected for the past 35 years. For the past several years Mr. Beveridge has been superintendent of the company's plant at Jenny Lind.

Charles A. Frisbie, of Boston Hill, outside foreman at No. 2 D. & H. Colliery, has been promoted to the general outside superintendency of the company's collieries of the Hudson Division, at Scranton, to succeed the late John Bowers. He will be succeeded at No. 2 by William Steevers, of the Boston Colliery.

Harrison S. Matthews, formerly of Birmingham, Ala., and for some time previous to the receivership of the Alabama Consolidated Coal & Iron Co., vice-president and general manager of that company, has been appointed vice-president and general manager of the Western Steel Co., with headquarters at Seattle, Wash., and has gone there to reside.

G. B. Burchell, formerly general manager of the Maritime Coal, Ry. & Power Co., at Joggins Mines, Nova Scotia, has opened a consulting office at 702 Canadian Building, Montreal, Canada. He expects to spend a few months in England and on the Continent. The carbo-electric plant at Chignecto, which was under his management, was described in the Dec. 7 issue of last year.

C. Dorrance, Jr., is appointed chief engineer in charge of the Mining and Mechanical Engineers' Departments, Fuel Testing and Fuel Inspection Departments, Briquetting Plant and Chemical Laboratory, of the Lehigh Coal & Navigation Co. The mining engineer, chief mechanical draftsman, chief coal inspector and chemist will report direct to him. The title of fuel engineer has been abolished.

L. E. Patton, who has for the past several years been manager of the Birmingham office of Hickman, Williams & Co., has resigned that position and organized the Southern Fuel & Iron Co. for the purpose of doing a general brokerage business. Mr. Patton has a broad acquaintance among the producers and consumers of coal and coke and will no doubt command a good volume of business. He is succeeded at Hickman, Williams & Co. by Day Williams, who has for many years been with the St. Louis office of that company.

TRADE CATALOGS

The Keystone Bulletin No. 25. The Keystone Lubricating Co., Philadelphia. This treats exclusively of the lubrication of mining machinery, with particular reference to mine cars. This pamphlet is well worthy of study by those who have lubrication troubles or excessive bills for pit-car oil. Copies mailed free on request.

The Milburn Oxy-Acetylene Welding and Cutting Apparatus. Catalog Q. November 1912. The Alexander Milburn Co., 1420-1426 West Baltimore St., Baltimore, Md. 32 pp.; 6x9 in.; describing various sizes of welding and cutting outfits and accessories. This firm also manufactures various sizes and types of acetylene lighting outfits, including miners' lamps.

OBITUARY

Edwin L. Wolford, a prominent coal operator in Linton, Ind., died at his home Jan. 14, after an illness of several months. Mr. Wolford was president and general manager of the United Fourth Vein Coal Co., which operates in the Linton field. He is survived by a wife, daughter and three sons.

PUBLICATIONS RECEIVED

TWENTY-FIFTH ANNUAL REPORT OF THE BUREAU OF MINES, MINING AND MINE INSPECTION OF THE STATE OF MISSOURI FOR THE YEAR ENDNG DEC. 31, 1912. By Geo. Bartholomaeus, secretary of the bureau. Cloth, 6x9 in.; 160 pages; one illustration, 20 tables.

The report is replete with much information and valuable statistics relating to the production of coal and improvements in the coal mines of the state. There are three lead and zinc mine inspectors. The coal mine inspectors are: Robert Richards, Bevier; Michael Gavin, Lexington; appointed respectively Apr. 15 and Feb. 15, 1909.

STATE OF TENNESSEE, TWENTY-FIRST ANNUAL REPORT OF THE MINING DEPARTMENT. By Geo. E. Sylvester, chief mine inspector, Nashville, Tenn. Cloth, 6x9 in.; 177 pages.

This report contains a number of tables and useful information and is worthy of special attention. Following a full account of the Briceville disaster, Dec. 9, 1911, at the Knoxville Iron Co.'s Cross-Mountain mine No. 1, the report gives valuable suggestions as to the causes and prevention of mine explosions, and devotes several pages to the discussion of gas and dust in relation to explosions. The use of steam, water sprays and salt are fully discussed, together with the application of stone dust and the need of loading out the dust accumulating in the mine workings. The report further treats the subjects of mine fires, mine laws, permissible explosives and first aid in mine rescue work. Following these are full statistics relating to the production of coal in the state and a description of the coal mines.

RECENT COAL AND COKE PATENTS

Coaling Device. C. C. Leftwich, Council, Va. 1,040,703, Oct. 8, 1912. Filed June 7, 1911. Serial No. 631,772.

Ore Screen. C. O. Michaelson, Omaha, Neb. 1,040,251, Oct. 1, 1912. Filed May 20, 1911. Serial No. 628,574.

Coal-boring Bit. With renewable cutters and auxiliary bit. George A. Moss, Plymouth, Penn. 1,040,383, Oct. 8, 1912.

Ore Bin Door. Oliver H. Dickerson, Duluth, Minn. 1,041,444, Oct. 15, 1912. Filed April 17, 1911. Serial No. 621,633.

Coal Separator. D. J. Middleton, R. M. Keefer and J. F. Ballamy. 1,040,374, Oct. 8, 1912. Filed Sept. 28, 1911. Serial No. 651,839.

Regenerative Coke Oven. Arthur Gohmann, Stettin, Germany. 1,041,457, Oct. 15, 1912. Filed Nov. 15, 1910. Serial No. 592,476.

Gas Producer. F. Merian, assignor to Forter Miller Co., Pittsburgh, Penn. 1,040,723, Oct. 8, 1912. Filed March 14, 1911. Serial No. 614,477.

Method of Making Hot Producer Gas. Emil Fleischer, Dresden-Alstadt, Germany. 1,041,058, Oct. 15, 1912. Filed Oct. 26, 1910. Serial No. 589,178.

Method of Mining Coal. J. H. Hoadley, New York City and W. H. Knight, Portsmouth, R. I. 1,040,679, Oct. 8, 1912. Filed Dec. 9, 1910. Serial No. 596,495.

CONSTRUCTION NEWS

Great Falls, Mont.—It is expected that in the early spring the Milwaukee R.R. will commence work on the survey for their proposed spur into Everson County, from Denton. The object of the spur is said to be to tap the coal deposits in the Everson field.

Danville, Ill.—The Bunsen Coal Co. is preparing to open a new mine on its property south of Danville. This mine will be the largest and best equipped of any colliery in the middle West. It is also stated that the new shaft will employ more than 600 men, when working at full capacity.

Bluefield, W. Va.—It has been learned that work has again been commenced on the survey for the tunnel of the Norfolk & Western through the Elkhorn mountain. When completed, the tunnel will be about three miles long and its grade almost level. The construction work will require about three years' time.

Holt, Ala.—The Central Iron Co., which has a blast furnace, pipe works and byproduct plant at Holt has broken ground for the erection of 20 additional ovens, thereby increasing the capacity 50 per cent. These ovens are of the Semet-Solvay type.

The Central company has recently completed a blast furnace at a cost of $325,000.

Youngstown, Ohio—It has been announced officially by the Republic Iron & Steel Co. that the new coking plant of the company would be built on 15 acres of land which the company has purchased between the Canfield branch of the Pennsylvania R.R. and Lake Erie & Eastern right of way. The contract for the ovens has already been placed with the H. Koppers Co., of Chicago. The new plant will have a capacity of 1000 tons of coke.

Portland, Ore.—The coal fields in Coos County, in the vicinity of Marshfield, will see active development during the coming summer. Considerable work is already under way and the scope will be enlarged with more seasonable weather. C. A. Smith, who is extensively interested in the manufacture of lumber on Coos Bay, is opening up a new mine on Isthmus Inlet, near Marshfield. A short spur has already been built from the Southern Pacific R.R., from Marshfield to Myrtle Point, and machinery for the mine will be hauled in soon. An electric haulage and lighting system will be installed.

From Coos Bay comes also the report that the old Beaver Hill mine of the Southern Pacific Co. is working on a new shaft and should be in good shipping condition the coming summer. This mine has shipped coal to Portland by steamer for several years, but the output has been rather limited.

NEW INCORPORATIONS

Coshocton, Ohio—The Dailey Cannel Coal Co.; capital stock, $25,000; to mine and deal in coal.

Cleveland, Ohio—The Midway Mining Co.; capital stock, $80,000; mining and marketing coal and clay.

Knoxville, Tenn.—The Hickory Coal Co.; capital, $30,000. Incorporators, N. S. Jenkins, Charles Jenkins, Brown Prosser and others.

Columbus, Ohio—The Burr Oak Coal Co.; capital stock, $35,000. Incorporators, Harry D. Shepard, Scott Dentol, Ulysses D. Beard.

Birmingham, Ala.—The Drennan Land Co.; capital stock, $100,000; to do a general land business and also mining coal and other minerals.

Page, N. D.—The Fargo Lumber & Coal Co.; capital stock, $25,000; filed Dec. 31. Incorporators, M. W. Murphy, E. F. Murphy and M. J. Murphy.

Waukegan, Mich.—Waukegan Lumber & Coal Co.; capital, $35,000; dealing in fuel and building materials. Incorporators, T. G. McGay, D. Q. Harts, J. D. Pope.

Topeka, Kan.—The Cherokee-Girard Coal Co.; capital, $30,000. Incorporators, O. S. Hubert, J. E. McFarland, O. E. Griffin, M. G. Slawson and J. O. Majors.

Trenton, N. J.—The Burns Bros. Co.; capital, $7,500,000. This is a consolidation of the coal companies known as the Burns Bros. Co., and the Curtis-Blaisdell Co.

Powhatan, W. Va.—Tierney Mining Co.; capital stock, $150,000; development of coal lands. Incorporators, E. M. Bush and E. V. Townsend, of Huntington, W. Va.

Salt Lake City, Utah—Articles of incorporation of the Ketchum Coal Co. A. T. Miller is president; F. A. Ketchum, vice president, and G. S. Payne, secretary and treasurer.

Fairmont, W. Va.—The Lehigh Coal Co.; capital stock, $150,000; mining. Incorporators, R. A. Pollock, of Massillon, Ohio; Thomas Williams, B. P. Porter, David Morrison, T. and G. D. Ewert, all of Cleveland, Ohio.

Dover, Del.—The Baker Bend Mining Co.; capital stock, $500,000; to do general mining, milling and refining of ores, metals, etc. Incorporators, Louis K. Stam, Chestertown, Md.; J. G. Gray and M. B. Hawkins, Wilmington, Del.

Cincinnati, Ohio—The Mineral Products Co., of New York City; capital stock, $100,000; minerals and mineral rights. Incorporators, Howard F. Campbell, of New York; Charles H. MacDonald, C. F. Hagedom, H. C. Humphreys and T. J. Keogh, all of Chicago, Ill.

Danville, Ky.—The Abigail Mining Co.; capital, $40,000. Incorporators, George P. Crow, John S. Van Winkle, Mitchell Taylor, Thomas Lanier and Judge B. O. Stone, all of Danville. Judge B. O. Stone and J. P. Harper will have active management of the business at the mine.

INDUSTRIAL NEWS

Laurier, Wash.—W. Pfiefer has commenced work at the Laurier mine. He expects to have two shifts working soon.

Birmingham, Ala.—A miner's safety lamp, the recent invention of Thomas A. Edison, is now on exhibition in Birmingham.

East Liverpool, Ohio—The Tri-State Electric & Ry. Co. has optioned 2000 acres of coal near the Island Run mines along Little Beaver Creek.

Pennsville, Penn.—Preparations are being made to fire the 25 ovens of the Pennsville Coke Co. at its Pennsville plant. The plant has not been run for several years.

Boonville, Ind.—Mine No. 3 has been shut down for an indefinite period because of differences between the miners and operators which could not be adjusted.

Jackson, Wyo.—A 5-ft. seam of good quality coal has been struck six miles southeast of Victor, by Cliff Bros. & Co. A tunnel had been driven 125 ft. into the hill, before the find was made.

Lancaster, Penn.—C. H. Holt and Leroy H. Holt have acquired the coal, lumber, grain and feed business at Landsville, together with the real estate occupied by the business, and a dwelling of Ezra Miller.

Du Bois, Penn.—It is stated by persons in a position to know that practically all of the holdings of the New York Central in Indiana County have been optioned by the Rochester & Pittsburgh Coal & Iron Co.

Altoona, Penn.—The mine known as No. 2, at Glen Campbell, is soon to be put in operation by Eastern capitalists. The workings were recently abandoned by the Irish Brothers Coal Mining Co., and sold with land adjoining.

Birmingham, Ala.—The Pratt Consolidated Coal Co. has begun to ship the 40,000-ton coke contract which it has made with the steel works at Monterey, Mex. The contract calls for the delivery of about 6000 tons a month.

Cleveland, Ohio—The coal men of Cleveland are getting busy and have taken options on some tonnage for Milwaukee in addition to covering a block of something more than a million tons, at 30c., for the head of Lake Superior.

Waynesburg, Penn.—W. H. Brown, of Pittsburgh, has purchased a tract of 1325 acres of coal land in Monongahela Township, from J. V. Thompson and associates, of Uniontown. It is reported that $800 an acre was paid for the land.

Sidney, N. S., Can.—The Nova Scotia Steel & Coal Co. has decided to open a new colliery at the Sidney mines. This brings the total plants of the company up to six, and increases the output from 850,000 to 1,000,000 tons annually.

Pottsville, Penn.—Weston, Dodson & Co., Inc., with operations at Morea and Kaskawilliam, announce that they are thoroughly developing their new operation in the north Mahoney region, from which they expect to ship by next autumn.

Benham, Ky.—The Wisconsin Steel Co., controlled by the International Harvester Co., has a million-dollar coke plant at Benham. This company operates the largest battery of ovens in that neighborhood, and ships its product to northern plants.

The Wallsend plant of the Continental Coal Corporation has recently begun operations. Ovens are also in blast in Pike County, in the Elkhorn district and elsewhere.

Rural Valley, Penn.—Colliery No. 2 of the Irish Bros. Coal Co., which has been abandoned for some time, is to resume operations under a different management. Considerable coal land has been bought in the vicinity recently, which will be developed in the near future.

Connellsville, Penn.—F. M. Coursin, representing a syndicate of Pittsburgh men, has purchased a tract of 2500 acres of coal in Washington County. The prices range from $200 to $300 an acre and the total sum involved is said to be in the neighborhood of $500,000.

Cumberland, Md.—The new steel coal tipple of the B. & O. R.R. in South Cumberland, has been completed, and was tested yesterday. By the aid of this modern tipple, one of the large engines was given its usual quantity of coal in exactly 32 seconds.

Butler, Penn.—There is a rumor that the Buffalo & Rochester Iron Co. will take over the coal interests held at present in Indiana County by the New York Central Road. It is expected that this will mean greater activity in the Indiana County field than ever before.

Bluefield, W. Va.—The Electric Transmission Co. has let contracts for buildings, electric machinery, boilers, etc., for the erection of a power plant at the mouth of the Lee County mines. These units represent an expenditure of $300,000. It is expected that the work will be completed by June.

Birmingham, Ala.—Eastern capitalists will soon undertake big coal development in the Birmingham district. The Panama Coal & Iron Co. has added to its holdings until now its total acreage has reached 35,000. The company already has contracts for a daily shipment of 2000 tons to South America.

Windber, Penn.—The Berwind-White Coal Mining Co. is planning several big improvements in its operating plant at Windber this year. Among these is the installation of a new turbine, at the central power house at mine No. 5, together with the addition of four boilers of the same capacity as those now in use.

Moundsville, W. Va.—The Wheeling Coal & Coke Co. has turned over the lease of 1000 acres of coal in Clay district to the Ben Franklin Coal Co. The minimum royalty is to be $12,000 per annum. The tract in question is that which is held in connection with the Panama mine.

Lock Haven, Penn.—Thirty-eight electric companies, in the counties of Lehigh and Northampton, in the anthracite region, have been authorized to combine and merge into the Lehigh Navigation Electric Co., a subsidiary of the Lehigh Coal & Navigation Co. This combination started through a plan to utilize the culm piles of the coal company.

Jenkins, Ky.—The different mines of the Consolidation Coal Co. are shipping an average of from 12 to 18 cars of coal a day and it is said this output will be practically doubled in the next few months. Coal from the McRoberts mines over the new extension of the Lexington & Eastern is now moving at a lively rate, three of the six mines being busy.

Louisville, Ky.—It is understood that both the Chesapeake & Ohio and the Norfolk & Western railways are in the market for coal cars, the former for 2000 of 70-ton capacity and the latter for 1250, of capacity not known as yet. The additional Chesapeake & Ohio equipment will give a better car supply for tidewater, as these cars cannot go west of Cincinnati or off their own lines.

Whitesburg, Ky.—The Berwind coal interests, operating the Pond Creek Coal Co.'s plants, at McVeight, are spending large sums of money in development work and the outlook is exceptionally bright in that locality for the new year. This plant is reached by the branch of the Norfolk & Western running out from Williamson, W. Va. Other plants in this field are showing unusual activity.

Boonville, Ind.—J. T. Blair, representing a Chicago coal firm, has taken options on 1200 acres of coal land for stripping purposes. He claims to be able to put the coal aboard cars for 35c. a ton. It is reported that the new company has an option on the coal lands of Dr. T. D. Scales, a prominent Democratic politician and coal operator of southern Indiana, in which the consideration is placed at $70,000.

McRoberts, Ky.—The Consolidation Coal Co.'s developments, on Wright's Fork, in the newest section of the Harlan field, have reached a point where its daily shipments over the Lexington & Eastern amount to from 20 to 30 cars. Four out of the company's seven mines are supplying this amount, and when the other three begin shipping the daily shipments of the company are expected to reach an average somewhere between 75 and 100 cars.

Louisville, Ky.—The proposed consolidation of the mines in Muhlenburg and Ohio Counties, in the western Kentucky district, appears to be considerably closer to consummation than was at first supposed. Reports from that section indicate that the representatives of the DuPont interests on the ground are having considerable success in obtaining options on the properties desired, and it is said that a very short time will see the completion of the deal. If the plan succeeds, the holding company, which will be known as the DuPont Coal Co., will control the greater portion of the entire output of western Kentucky, inasmuch as Muhlenberg County has for some years past produced more coal than any other county in that part of the state.

COAL TRADE REVIEWS

GENERAL REVIEW

The premiums on anthracite are gradually disappearing and the snappy condition of the trade has undoubtedly given way to what may be considered a slump. Because of the unseasonable weather conditions, and the fact that the summer reduction in the circular is now only about two months off, dealers are becoming decidedly cautious about acquiring new stocks. Consumers are certainly displaying a marked lack of interest in the trade and dealers are beginning to fear that the customary dull period in March, prefacing the April reduction in quotations, will find them overstocked. Some contracts are being renewed at last year's figures. Coastwise shipping has been interfered with by the heavy gales, and, as a consequence, loading has been rather slow.

The first break in a long time on bituminous, occurred during the past week, and there has been a generally receding market, with prices weak and materially off. While there is still a shortage in some few quarters, good-sized tonnages are being offered and large corporations are now buying at lower figures; shippers not only have free coal for sale, but are actively canvassing for buyers. The open winter has been decidedly unfavorable to consumption and operators are coming nearer meeting their contract obligations.

The floods in the Pittsburgh district have interfered with the manufacturing consumption, the mild weather has curtailed the domestic demand, and the prompt market is now quotable at only a little above the contract circular; the river mines are still idle, although they are slowly getting in operation again. However, there is a strong natural consumption, which, together with the delays in transportation, has made the accumulation of an over-supply out of the question.

The high temperatures have affected a falling off in the Ohio market, where prices are lower than at any time during the past five months, particularly on domestic, the steam grades still being fairly strong. It is entirely a weather market and it is believed that consumers have been buying in excess of their requirements for the past 60 days or more. There is a downward tendency in quotations at Hampton Roads, due to the unexpectedly heavy loading at the mines and the diverting of Western tonnages into the Eastern markets, because of the floods. The situation in the Southern markets appears to be somewhat better, there being a fair demand and prices ruling firm; coke is particularly strong, with considerable inquiries from the Western smelters.

The Middlewestern market is weak in all branches, with the exception of steam, which is only fair. The movement on the railroads has been quite free, and considerable demurrage coal has collected on tracks at various points which cannot be moved. The delayed winter has had disastrous results on this market.

BOSTON, MASS.

The week has shown a generally receding market and prices are off materially in bituminous. The Hampton Roads shippers have eased their situation so much that some of them now have coal for sale, and not only that, but are actively looking for orders. The Pennsylvania grades have sagged in consequence, and the continued mild weather and the abundant supply of water power through New England are reducing consumption to the minimum for January. There is still a shortage in many quarters, but the demand is by no means insistent and there is quite a volume of coal being offered at the various distributing points. The big corporations are still buying, but at much lower figures than a week ago. A drop of 40c. about measures the scaling down of the different grades of bituminous for consignment to this section.

Already there are signs of the approaching contract season. It is rumored that $2.85 f.o.b. Hampton Roads, is to be the initial figure for Pocahontas and New River for shipment prior to Oct. 1, and it will be interesting to see how well it carries out. The top contract price in 1912 was $2.70, but by far the most of the business was closed at $2.50@2.60; $2.85 would net $1.45 at the mines, less the selling commission.

All-rail there is much less speculative coal offering. The movement on contract seems to be fairly regular, except where there are restrictions as to kinds of cars. Some of the Pennsylvania districts have suffered from floods and empty cars in transit have been appropriated more or less by connecting lines. The Georges Creek situation is practically unchanged. Shipments are few and far between, and distributors at this end are hard to put to it to keep contractors going. In many cases they have had to admit their inability to do so, and all manner of expedients is being resorted to. Coal from Somerset County, Penn., and from West Virginia is being freely shipped to take care of Georges Creek orders.

The premium market on anthracite seems to be fading away. On rail shipments at least, egg size is quoted at only 10c. over the regular company circular and the slackness of the retail demand has about eliminated fancy-priced coal for the present. Coastwise conditions have been unfavorable of late, and gales have been the steady thing for a week or ten days. Loading continues slow and most of the dealers are getting only enough to keep them in business. There begins to be an accumulation of egg and chestnut in some places, but retailers are still taking these sizes in their eagerness to get stove and pea. It will be a long time before shipments have caught up, although at this end things are apparently easier than at any time since September.

Current wholesale prices are about as follows:

Clearfields, f.o.b. mine	$1.55@$1.85
Clearfields, f.o.b. Philadelphia	2.80@ 3.10
Clearfields, f.o.b. New York	3.15@ 3.40
Somersets, f.o.b. mine	1.70@ 1.95
Somersets, f.o.b. Philadelphia	2.95@ 3.20
Pocahontas, New River, f.o.b. Hampton Roads	3.15@ 3.35
Pocahontas, New River, on cars Providence	4.30@ 4.50
Pocahontas, New River, on cars Boston	4.40@ 4.50

NEW YORK

Anthracite—The past week has witnessed a still further easing off of the hard-coal situation here and it has now reached such a stage that the large companies are beginning to receive cancellations on certain grades. The weather conditions have certainly been most favorable to the hard-coal companies, in view of the shortage of some six million tons in production. The season is now so far advanced, that even the most abnormal weather conditions could not cause any great distress before spring.

As a matter of fact, the operators would like to see a little more activity in the market. With the reduced summer circular going into effect Apr. 1, requisitions for fuel during March are naturally cut to the lowest point possible, so that dealers have now only about one month left in which to dispose of the comparatively high-priced stocks on hand. However, it seems reasonable to believe that the next 30 days will develop some more seasonable weather. The mines are reported as working good, and the car supply is fair and all that is to be expected for this period of the year.

We quote New York prices on both hard and soft coal on the following basis:

	Anthracite		Bituminous	
	Circular	Individual		
Broken*	$5.00	$5.00@5.10	West Virginia, steam	$3.05@3.25
Chestnut†	5.50	6.00@6.15	Fair grades, Penna...	3.15@3.25
Pea*	2.75	3.75@4.35	Good grade, Penna....	3.30@3.40
Buckwheat**	2.75	2.75@2.80	Best miller, Penna....	3.40@3.50
Buckwheat†	2.50	2.40@2.50	Georges Creek	3.50
Rice**	2.25	2.25@2.30		
Rice†	1.95	1.85@1.95		
Barley†	1.75	1.25@1.50		

* Scranton and Lehigh. ** Scranton. † Lehigh and Schuykill.

Bituminous—For the first time in over a month, there has been a slight break in the soft-coal market. While the effects of this are not yet very clearly felt at tidewater, it is, nevertheless, a fact that concessions under last week's quotations are now readily obtainable in the mining region. This applies more particularly to the lower grades and it is doubtful if the quotations on the better qualities have suffered in any way as yet. While free tonnages are obtainable at the mines, some of the large operators are quite short on their contracts at tidewater.

It is still essentially a weather market, and it is rather remarkable that it has held so good under the unusually unseasonable weather conditions prevailing through the fall and winter. This is only accounted for by the shortage in transportation facilities and, had the weather conditions been as normally, there would have been a heavy shortage at this point accompanied by the usual spectacular market.

Floods in the Pennsylvania district have handicapped operations somewhat, but not seriously. The car supply has been rather inadequate, but there is a fair amount of labor available, and, on the whole, production has been good in the region.

PHILADELPHIA, PENN.

The same unseasonable weather still continues in this vicinity, and as a consequence, there has been a decided falling off in the demand for anthracite. Egg coal is a drug on the market, and while it is understood the large companies are moving off their product, it must be in other directions. The snappy condition of the trade has undoubtedly given way to what might be almost considered a slump. Stove and pea seem to be the only sizes for which there is any demand at all; egg and chestnut cancellations are coming in thick.

It is now simply a question of the weather conditions. It is a fact, nevertheless, that the dealers are not well stocked with any particular sizes, although orders are being filled fairly promptly, that is, for stove and pea, but any sudden cold spell would be likely to bring about a sudden strengthening in the situation. The uncertainty of the weather, however, is causing the dealers to be cautious about laying in stocks of coal that they are likely to be caught with during the month of March, when the trade, as a rule, is rather stagnant.

Prices still remain at the same level, at retail, $6.75 for egg, $7 for stove, $7.25 for chestnut and $5.50 for pea. It is understood that the parties who contract for their fuel requirements at this season of the year, are, as a rule, renewing their arrangements for the ensuing year. The same prices prevailing last year are in effect, with the exception of pea, on which there has been an advance in the contract price of 50c. per ton; the price of this coal has made it practically out of reach of the majority of steam users, and most if not all of this demand has been diverted onto buckwheat, which is $1 per ton less. Pea coal is becoming, more and more a domestic fuel in this market, and the demand far exceeds the supply during most of the winter months.

PITTSBURGH, PENN.

Bituminous—River mines, which were closed on account of high water are still idle, although partial resumptions are occurring this week. The car supply is better, railroads being aided by unusually good January weather. Floods have seriously affected manufacturing operations along the rivers and have somewhat decreased coal consumption, while on account of mild weather the domestic demand is limited. Prompt coal has declined with these conditions and is quotable at but little above regular contract prices, which are well maintained as follows: Slack, 90c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.55, per ton at mine, Pittsburgh district.

Connellsville Coke—The market has been uneventful. There has been practically no contract business, while the spot business has been light, much lighter than was expected. Practically the entire production is going out on contracts and little prompt coke is available, so that prices for this have not declined in the face of a small demand. The $4 price for prompt furnace, however, is not invariably maintained. Occasionally a consumer can buy for a shade less, while as a rule a dealer can shade the $4 price enough to make a comfortable brokerage, securing $4 from the consumer, which is usually obtainable. Foundry coke for prompt shipment is not closely quotable for the reason that there is little if any really standard foundry coke available in the prompt market. Foundries caught short must usually be content with furnace coke, sometimes selected and sometimes not, and frequently shipped in open cars. The mere shipment in box cars raises the price to $4.25 or even $4.50. We quote: Prompt furnace, $4; contract furnace (nominal), first half, $3.25@3.50; year, $3@3.25; prompt foundry, $4.25@4.75; contract foundry, $3.25@3.75.

BALTIMORE, MD.

Prevailing open-weather conditions tended to create an easier market in Baltimore during the past week, although one or two of the larger operators reported that they experienced no falling off in the demand. Prices, however, declined from 10 to 15c.; one firm was offering coal at $1.75 and appeared to have plenty on hand to meet all demands.

Local consumers appear totally indifferent to the market, realizing perhaps that weather conditions are such as to permit them to purchase in any quantities desired at a reasonable price. There was practically no spot business during the week.

The car supply appears to be adequate, the train movements are excellent and contract obligations are being carefully met. The output of the mines is also increasing, as the miners are rapidly getting back to work again.

There has been considerable activity at the local coal piers, and at least a half-dozen vessels will load here during the next ten days.

The anthracite trade is feeling the effects of the most remarkable weather conditions experienced in this section for twenty-five or thirty years. All through the week it was too warm to keep fires going in furnaces, and practically all the fuel consumed in the households was for cooking purposes.

BUFFALO, N. Y.

The weather has been doing its best to shut off the sale of coal, but other conditions are such that a moderate degree of dullness is about all that has been accomplished. There is a big natural demand and the slow movement has made it impossible for the operators to flood the market. So far they have not been able to accumulate any great amount of coal at any point and the consumer has to look for his supplies or he does not get them.

With the weather as favorable to freight movements as it could possibly be at this time of the year, and with the rush in the grain business out of the way, there is about as great a shortage of coal cars as ever. The consumption also promises to keep up as business is paying next to no attention to politics. Bituminous quotations will therefore remain rather weak at $3 for Pittsburgh select lump, $2.85 for three-quarter, $2.75 for mine-run and $2.50 for slack, with Allegheny Valley about 25c. less. The coke market holds fairly strong, the high prices remaining on account of the production about reaching its limit of late. Prices f.o.b. Buffalo are still on a basis of $6.25 for best Connellsville foundry.

There is still much water to contend with in the mining districts of the Allegheny Valley and beyond, but at present only the convenience of working certain mines is affected. The running of trains has not been interferred with for a week or more.

The anthracite shippers are getting some orders to hold or cancel former shipping directions but they are not disturbed. A single day of really cold weather would restore the demand in full. Egg coal is plenty and premiums on independent anthracite are down to 75c. on chestnut and $1 on stove.

COLUMBUS, OHIO

With high temperatures prevailing lately, weakness has developed in the domestic trade and prices are much lower than in months; in fact the past week saw the first real easing off in quotations for five months. Domestic lump and ¾-in. are particularly heavy, and the other grades have declined in sympathy with these. Retailers have unusually large stocks on hands, and as a result are not in the market at this time.

Steam business is still the strongest point in the trade. Manufacturing establishments, especially those engaged in the iron and steel industries, and the railroads are taking a large tonnage, while prices are being fairly well maintained. Renewing of fuel contracts is slow as few of them expire at this time.

The car supply is now about all that could be desired. Output in the various mining districts has been curtailed, not by a lack of cars, but rather because of a slack demand. Eastern Ohio is about the only section that reports any trouble over the supply of equipment. The Hocking Valley is well fixed and as a result, production in that district has been about 75 per cent. of normal. Eastern Ohio has produced about 65 per cent., but Pomeroy Bend's output was curtailed by the high waters which flooded a number of mines in that section. West Virginia competition was shut off, a portion of the past week, by the high waters. Both the C. & O. and the K. & M. were unable to run trains from the West Virginia fields to the Ohio side.

While the weather has been unfavorable to an active coal trade in Ohio, still the movement has been good in most lines and prices remain fairly strong. The worst feature of the trade is the growing softness in the domestic lines. This is due to the mild weather which has been prevailing and makes the retail trade rather quiet. The car supply is slightly improved and this aids the operators and jobbers to move cargoes more promptly.

This softening, however, has not gone far enough to cause any decline in quotations, excepting the usual shading which is done at all times. The circular which has been in effect since Dec. 1 is pretty well maintained and complaints of price cutting are few and unimportant.

Quotations in Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.85	.....	$2.00	$1.65
¾-inch	1.65	$1.30	1.75	1.40
Nut	1.35	.....	1.75	
Mine-run	1.35	1.15	1.25	1.25
Nut, pea and slack	1.15	.....	1.25	1.10
Coarse slack	1.05	1.15	1.10	1.00

CLEVELAND, OHIO

The situation in the coal trade here is largely a weather proposition. Producers and shippers are convinced that consumers have purchased coal in excess of their requirements for the past 60 days. Buyers are fairly well fortified against a scarcity of fuel and in many cases have suspended shipments temporarily. Slack which is the ruling factor on the Cleveland market has weakened to the extent of 10c. a ton.

Quotations per net ton f.o.b. mines are as follows:

District	Freight Rate	¾-in.	Mine Run	Slack
Youghiogheny	$1.00	$1.35	$1.25	$1.05
Pittsburgh No. 8	0.90	1.20	1.10	1.05
Goshen No 6	0.70	1.35	1.25	1.20
Coshocton	0.70	1.75	1.50	1.10

Hocking Lump which was sold at $2 in the early fall has dropped to $1.60 at the mines. Pocahontas lump and egg is quoted at $2.50, run-of-mine, $1.35, and slack, 90c. Massillon lump is going $2.50 at the mines. Prices on coke are steady at about $3.50 f.o.b. ovens for contract and $4 for spot furnace with about 50c. added for foundry grades. Production in Jefferson and Belmont Counties is at an abnormally low ebb, the high water in the rivers and tributary streams having lessened the output of the mines and tied up railroad traffic.

It will be late in the season before the Lake fleet can get coal to the docks if the mines shut down for any length of time in April, 1914. Dock companies expect to be prepared for a suspension then by carrying the maximum capacity of coal on upper lake docks at the close of 1913 season. To accomplish this a large volume of bituminous and anthracite will be shipped via the Great Lakes this year.

The following letter, signed by C. W. Galloway, general manager of the Baltimore & Ohio R.R. was mailed to all mine operators recently: "The movement of freight tonnage throughout the United States is the heaviest known. On account of the extreme car shortage it is necessary that greater efficiency than ever before be secured from freight equipment. Careful checks of cars received from mines underloaded with coal, have shown that equipment is not being loaded to its full physical carrying capacity. Will you not kindly coöperate with us by loading cars to full limit. Every ten cars so loaded means a car saved."

HAMPTON ROADS, VA.

Prices of New River-Pocahontas coal have had a downward tendency during the past week owing to the warm weather, the unexpectedly heavy loading at the mines and partly to the diversion of considerable Kanawha gas and splint coals from the West to tidewater. This latter was due to the interruption to westbound traffic by the collapse of a bridge over the Guyandotte River, on the Chesapeake & Ohio Ry., near Huntington, West Virginia.

The New England market seems to be taking no coal except for contract requirements and but few spot sales have been made. $3.15@3.25 f.o.b. Hampton Roads, is about the ruling price at present and sales have been made at both those figures. A cargo (5000 tons) of Kanawha coal was sold for New England at $3, but this grade is now offered at $2.82.

The car supply at the mines has been somewhat better than during the past ten days, which may be ascribed naturally to the light loading during the holidays and also to the better movement by the railroads. The Virginian Ry. has been doing exceptionally well in this respect; on Jan. 10, some 410 cars were loaded, the heaviest day's loading they have ever had.

A new harmony movement was started by this road last week when all representatives of coal sales agencies at Norfolk, were invited to luncheon by the company to discuss various questions of handling their coal at tidewater. It is proposed to have similar meetings once every month, a plan that might advantageously be followed by the other railroads.

The United States Navy has recently closed contracts for the next six months' supplies of New River-Pocahontas coals at $3 per gross ton f.o.b. Hampton Roads, an advance of 30c. over last year's price. The export and bunkering business continues fairly heavy, the respective tonnages for the week being 58,832 and 9929 tons.

LOUISVILLE, KY.

The unusually mild weather which is again prevailing, is another cause for the present slow market. While this factor does not enter to a great extent into the demand for steam grades, it is responsible for a rapid movement, which would be impossible even in normal winter weather. Heavy rains and resulting floods throughout the state have done some damage to mining equipment, bridges and the like, and if they become such as to interfere seriously with operations the market will doubtless show a stiffer trend.

Altogether, the mines are practically at a standstill for lack of domestic orders, and while the steam demand is fairly good, the market on those grades has also dropped off to a noticeable degree. Some mines are face to face with the proposition of selling their coal at unduly low prices, or going on short time. In the absence of a season of real wintry weather, which has been almost totally lacking so far, the only thing which will operate to restrain this tendency from working a still further demoralization of the market is the closing down of some mines by the floods.

BIRMINGHAM, ALA.

There is no material change in the situation since our report of last week. There seems to be plenty of demand and good prices rule on all grades of coal. The volume of business in all lines in the South was never as large as it is at present. Recent statistics show that a smaller percentage of Alabama iron is being shipped out of the state than at any time in the history of the iron business.

The market for both foundry and furnace coke is firm. There has been considerable inquiry from the West for smelter coke, and although none of the ovens have large tonnages for nearby shipment, some business was placed with the local manufacturers.

We can quote standard furnace coke at $3.50@3.75, and foundry coke from $4@4.25, f.o.b. local ovens. Nut, domestic coke can be had in small shipments at from $2.75@3 Birmingham district.

CHICAGO

As a result of the unusual weather conditions, the Chicago coal market, in almost all branches, is weak and retail dealers are ordering little coal.

According to reports from various sources, their storage capacity is taxed to the limit on account of slack business; excepting coke, there is not a branch of the domestic trade that is not suffering from lack of business. A great deal of anthracite still remains in the hands of the dealers, many of whom are cancelling orders previously placed. On this account, the market has eased off to a considerable extent. There is practically no demand in Chicago at the present time for Hocking and splint coal. Hocking domestic lump is selling at $1.50 a ton, f.o.b. the mines, when up to car service in Chicago, with shipments in transit being quoted at $1.75.

The car supply has been much better than was expected. Shipments to market, as a rule, are free and scarcely any complaints are being registered against the railroads. The steam trade continues to be satisfactory.

Prevailing prices in Chicago are:

	Sullivan Co.	Springfield	Clinton	W. Va.
4-in. lump	$2.62	.....	.....	.....
Domestic lump	.....	$2 32	$2.27	.....
Egg	2 52	.....	.....	$3.80 @ 4.05
Steam lump	.....	2.12	2.17	.....
Mine-run	2.07 @ 2.17	1.97	1.97	3.55 @ 3.65
Screenings	1.72 @ 1.77	1.57 @ 1 62	1.57 @ 1.62	.....

Coke—Connellsville, $6.50@6.75; byproduct, egg, stove and nut, $5.75@6; gas house, $6.

DETROIT, MICH.

Bituminous—The market here is controlled entirely by the weather conditions. Prices are gradually dropping and unless there is colder weather, there will be a lot of demurrage collected for track coal that cannot be moved. The car supply is unusually good. Contract fuel is coming along more readily now so that spot coal is not monopolizing the cars; steam coal is not in much demand on the larger sizes. Slack holds very firm, although the demand is not as great as it has been. There is no demand whatever for domestic coal; all the dealers seem to be loaded to their utmost capacity and in a few cases on demurrage, it has been offered

for the freight, but was promptly refused. Every operator is selling as much as possible, for almost any price that can be secured.

The following are local quotations, f.o.b. mines:

	W.Va. Splint	Gas	Hocking	Pitts. No. 8	Jackson Hill	Pocahontas
Domestic lump	$1.40	.....	$1.40	.....	$2.00	$2.00
Egg	1.40	.....	1.40	.....	2.00	2.00
Nut	1.30	.....	1.30	.....	.....	.....
¾-lump	1.15	$1.15	1.10	$1.10	.....	.....
Mine-run	1.00	1.00	0.90	0.90	.....	1.25
Slack	1.10	1.10	1.00	1.00	.....	1.05

Anthracite—Anthracite is coming in in large quantities, but there is still a light demand for it. However, prices remain firm and it is being quoted about 50c. per ton above circular on all sizes.

Coke—This product has taken a decided slump and there is little or no demand for it. Connellsville is being quoted at $4.25; Semet Solvay, $4.25, and gas house at $4 f.o.b. oven.

ST. LOUIS, MO.

Prices hit the bottom of the market the past week, on account of the failure of winter to put in its appearance, as had been promised. Practically every coal got down to summer prices again, with the exception of the finer grades for steam; as the domestic sizes eased off the steam grades went up.

The present week will no doubt see slightly better quotations, as weather conditions are inclined to be more favorable, and it is likely that, for the balance of the month coal will continue to gradually increase.

The demand for anthracite chestnut still exceeds the supply, and coke is very scarce, while smokeless, though strongly in demand, is very little heard of, account of the shippers not being able to furnish enough cars. All kinds of coal is moving very slowly, especially when connection has to be made to some delivering line.

The prevailing market has been:

	Carterville and Franklin Co.	Trenton and Big Muddy	Mt. Olive	Standard
2-in. lump	.....	.....	.....	$0.95 @ 1.00
3-in. lump	.....	.....	$1.30	.....
6-in. lump	$1.30 @ 1.40	.....	1.50	1.15 @ 1.20
Lump and egg	1.40 @ 1.55	$2.00	.....	.....
No. 1 nut	1.15 @ 1.25	.....	.....	.....
Screenings	0.80 @ 0.90	.....	.....	0.55 @ 0.60
Mine-run	1.10 @ 1.15	.....	.....	0.90 @ 1.00
No. 1 washed nut	1.50	.....	.....	.....
No. 2 washed nut	1.50	.....	.....	.....
No. 3 washed nut	1.40	.....	.....	.....
No. 4 washed nut	1.20	.....	.....	.....
No. 5 washed nut	0.85	.....	.....	.....

MINNEAPOLIS—ST. PAUL

A number of the smaller operators in this field were forced to cut prices in order to pay wages and other expenses or go under. This condition has been quite discouraging to Illinois men to say the least, as the break in Franklin County coal, which is the leader, has had a tendency to weaken all other Western coals. Carterville district is bringing from $1.50@1.75 for the best domestic grades, although some has been sold as low as $1.40. Springfield coal is selling for from $1.35@1.50 lump.

SPOKANE, WASH.

Cold weather prevailing in Spokane has caused a heavy run on the coal stocks of the city, but there is not any danger of a famine. Shipments from the east and west are being delayed by landslides, and washouts, but Canada coal is coming in and is meeting all demands. No raise in price is anticipated for some time.

	Crows Nest	Wyoming Northern	Wyoming Southern	Utah	Montana	Roslyn
Lump	....	$6.45	$7.20	$7.20	....	....
Lump and egg	....	....	....	....	$6.35	....
Furnace	$6.00	....	....	....	....	....
Egg	....	5.95	6.85	6.85	....	....
Mine-run	5.00	....	....	....	....	$5.00
Slack	4.50	....	....	....	....	....
Screened domestic	....	....	....	....	....	6.25

PRODUCTION AND TRANSPORTATION STATISTICS

VIRGINIA RAILWAY

Total shipments of coal over this road for November of 1912 were 316,504 net tons, as compared with 338,518 for the month previous.

CONSOLIDATION COAL CO.

Production of the Consolidation company for the year to Jan. 1 last, was 10,342,000 tons, as compared with 9,210,000 for 1911, showing a gain of 1,132,000 tons. With the heavy tonnage now being obtained in the Elkhorn field, production for the current year will show a still more rapid increase.

THE CAR SITUATION

For the first time since Aug. 15 of last year the American Railway Association again reported a surplus of coal equipment on Dec. 31, the following being a comparative summary of the last six reports:

Date	Number idle (net)	Decrease	Including Box	Flat	Coal
Dec. 31, 1912	17,058	51,450	†11,018	1,330	8,087
Dec. 14	†34,392	2,009	†30,818	†816	†8,801
Nov. 30	†36,401	14,711	†33,241	†1,463	†5,179
Nov. 21	†51,112	57	†38,465	†3,217	†12,005
Nov. 7	†15,169	*1,188	†43,831	†3,613	†7,599
Oct. 24	†49,981	*18,402	†38,177	†3,837	†13,252

* Increase † Net shortage.

CONNELLSVILLE COKE

The "Courier" reports production and shipments in the Connellsville region for the week ended Jan. 18, as follows:

Production (tons)	Week	3 weeks	*Shipments (cars)*	Week	3 weeks
			Pittsburgh	4,582	13,019
Connellsville	237,289	773,735	W. of Pittsburgh	7,151	20,231
Lower Connellsv'le	192,539	549, 761	E. of Region	929	2,743
Total	429,828	1,323,496	Total	12,662	35,993
Same period 1912	395,185	1,018,523		11,271	29,707

SOUTHWESTERN TONNAGE

The following is a comparative statement of the Southwestern production for July and August, 1911 and 1912:

State	July 1911	July 1912	Change	August 1911	August 1912	Change
Missouri	173,809	176,125	+2,316	186,852	213,603	+26,751
Kansas	374,137	337,367	—36,770	400,820	408,947	+8,127
Arkansas	120,790	126,224	+15,434	139,762	172,090	+32,328
Oklahoma	157,633	201,959	+44,326	257,773	232,768	—25,005
Totals	826,369	841,675	+15,306	985,207	1,027,408	+42,201

FOREIGN MARKETS

GREAT BRITAIN

Jan. 10—At present there is a strong demand for all qualities of large and small. Tonnage arrivals are substantial, and chartering is very active. Quotations are as follows (approximately):

Best Welsh steam	$4.56	Best Monmouthshires	$4.20
Best seconds	4.38	Seconds	4.08
Seconds	4.26	Best Cardiff smalls	3.48
Best dry coals	4.38	Seconds	3.12

The prices for Cardiff coals are f.o.b. Cardiff, Penarth, or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both exclusive of wharfage, and for cash in 30 days —less 2½%.

ORIENTAL MARKETS

Japan, Nov. 28 1912—A fair amount of business has been done on this market during the past fortnight and some contracts of considerable importance have been settled on private terms, whilst there is still a certain amount of enquiry going on amongst native dealers for forward business for next year.

The coal-market in Japan is very firm and prices are ruling about 20 sen higher all round: Stocks of all grades have sunk very low at Japan shipping ports. Stocks on the spot are up to the average and prices are firm at quotations.

Manchuria—Quite a brisk business has been done and in spite of the daily output having reached 5000 tons it is all being consumed on the spot or has been contracted for export.

Kaila—Althought there is a certain amount of enquiry not much actual business has been done; contractors are still bolding off on the chance of a decline of freights but these appear to be as strong as ever. Stocks remain small.

Quotations remain unchanged as follows: Lump, $2.75; nut, $2.25; mine-run, $1.85; slack, $1.

SPANISH IMPORTS

Spanish imports of coal for 10 months to Oct. 31, 1912, were 1,866,627 tons, as compared with 1,724,107 tons in 1911. Coke imports for the same periods were: 287,700 and 269,842 tons, respectively.

FINANCIAL DEPARTMENT

The Pacific Coast Co.

Besides controlling the Pacific Coast Steamship Co. and several railroad companies, this corporation owns all the securities of the Pacific Coast Coal Co. This latter concern owns the Franklin mines, aggregating 3850 acres at Franklin, Wash.; the Black Diamond mine with 4670 acres at Black Diamond, Wash.; the Newcastle mine with 2520 acres at Newcastle, Wash.; and the South Prairie mine, with 1140 acres at Burnett, Wash. Company also owns coal-handling plants at Seattle, Tacoma, San Francisco, Portland, Juneau and Nome, Alaska.

During the last two years the company has paid 6% dividends on both the common and second preferred stock and 5% on the first preferred. The report for the fiscal year ending June 30, 1912, showed: Gross from steamships and colliers, $4,181,147, and net, $143,389; railroads, gross, $761,775, and net, $554,254; coal department and miscellaneous, gross, $2,553,990, and net, $388,868.

The gross earnings of all departments were $7,496,912; operating expenses and taxes, $6,410,401, making net earnings $1,086,511, to which are added $28,579 other income, bringing the total net up to $1,115,090. Interest on bonds amounted to $250,000; depreciation special reserve, $103,430; dividend on first preferred (5%), $76,250; dividend on second preferred (6%), $240,000; dividend on common (6%), $420,000. This leaves a balance surplus for the year of $25,410.

Gross earnings of the coal department amounted to $316,731; operating expenses, $214,198, making the net earnings $102,533; all these accounts show a decrease during the year. The total output of the mines was 709,262 tons, including 16,116 tons from mines under development; this shows a decrease of 28,493 tons over that of the previous year. The amount of coal sold at all depots was: From company's mines, 671,290 tons; other domestic coal, 12,129 tons; foreign coal, 68,616 tons, making a total of 752,035 tons, or a decrease of 81,769 tons below last year.

The decreased output and sales is ascribed partly to depressed business conditions and partly to the competition of California fuel oil which has been selling quite cheaply during the past year. A large number of steamers have been converted into oil burners and a number of railroads are now using fuel oil on their Pacific Coast divisions.

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The Lehigh Valley Coal Co.

President E. B. Thomas, of this company, has the following remarks to make regarding the year's operations, ended June 30, 1912:

The suspension of mining operations for practically both the months of April and May, during which time the company was deprived of any revenue from its property, naturally made a serious reduction in the year's income. The agreement with the mine workers expired by limitation on the 31st day of March, and, while negotiations for a new agreement were in progress, the mines remained idle. An agreement was finally reached in the latter part of the month, which gave to the mine workers a substantial increase in wages and mining was, therefore, promptly resumed.

The total net income of the company from all sources, after deducting charges for royalties, sinking funds, improvements to the property and interest on the funded debt, amounted to $1,162,241, a decrease of $350,603, as compared with the previous year.

The total production of anthracite coal from the lands owned, leased and controlled by the Lehigh Valley Coal Co. and affiliated companies, including that mined by tenants, was 8,224,317 gross tons, a decrease of 796,889 tons, or 8.83%, as compared with the preceding year.

The percentage of sizes above pea produced by the mining operations of the company was 67.67%, an increase of 2.10%.

The bituminous coal mined from the Snow Shoe lands amounted to 280,084 gross tons, an increase of 43,154 tons.

To offset in some measure the constantly increasing cost of mining, which is every year becoming more serious, owing to the greater depth and extension of the underground workings, with the attendant increase in the length of the underground haul, heavier expense for pumping and ventilation and legislation adding directly to the cost of operation, it has been necessary to continue making substantial expenditures for improvements and betterments to the property. Expenditures for such purposes during the year, deducted from income, amounted to $487,456, an increase of $42,779 over the preceding 12 months.

By appropriate court proceedings the Locust Mountain Coal & Iron Co. has been dissolved, the charter surrendered and its capital stock, all of which was owned by your company, canceled, thus obviating the necessity of maintaining that separate corporation with its attendant expense. Prior to its dissolution, the real estate of that company, consisting of certain coal lands in Columbia, Schuylkill and Northumberland Counties, Pennsylvania, from which your company has been mining under lease for many years, together with all its personal property of every description, was conveyed to the Lehigh Valley Coal Co. for a nominal consideration.

On March 1, 1912, this company redeemed and canceled the $10,537,000 certificates of indebtedness isued in 1905 to the Lehigh Valley R.R. Co. for moneys advanced to it by that company for capital expenditures; $3,037,000 of the said certificates of indebtedness were paid off in cash and the balance, $7,500,000, was taken up by the issuance in lieu thereof to the Lehigh Valley R.R. Co. of a similar amount of 50-year debenture obligations, maturing March 1, 1962, and bearing interest at the rate of 4% per annum, payable on March 1 and Sept. 1 of each year. At the time this transaction was consummated the arrearages of interest on the certificates of indebtedness were paid to the Lehigh Valley R.R. Co. at the rate of 4% per annum. That amount of the interest which accrued prior to the present fiscal year was charged to profit and loss and the balance deducted from this year's income. In addition, the income account of this fiscal year has also been charged with the accrued interest on the debenture obligations.

There were outstanding at the close of the previous fiscal year $1,292,500 short term notes given for the acquisition of property; $200,000 of these notes have been paid off during the year, leaving $1,092,500 of such obligations outstanding at this time.

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COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending Jan. 18:

Company	High	Low	Last
American Coal Products	94	94	94
American Coal Products Pref	109¼	109¼	109¼
Colorado Fuel & Iron	33½	31	32
Consolidation Coal of Maryland	103¾	103¼	103½
Island Creek Coal Pref	87½	87½	87½
Lehigh Valley Coal Sales	240	204	204
Pittsburgh Coal	22	21½	22⅜
Pittsburgh Coal Pref	92¾	87	89
Pond Creek	26	24½	25½
Reading	167	160⅜	162⅜
Reading 1st Pref	90⅝	90	90
Reading 2nd Pref	91½	91	91½
Virginia Iron, Coal & Coke	53	52	52

Bonds Company	Closing Bid	Asked	Week's Range or Last Sale		Year's Range	
Colo. F. & I. gen. s f g 5s	98	102	98	98	97	100⅜
Colo. F. & I. gen. 6s	....	....	107½	June '12	107½	107½
Col. Ind. 1st & coll. 5s. gu	83½	Sale	83½	84	72½	85½
Cons. Ind. Coal Me. 1s 5s	....	84½	85	June '11	....	....
Cons. Coal 1st and ref. 5s	....	94	93	Oct. '12	93	94
Gr. Riv. Coal & C. 1st g 6s	95	..	102⅜	Apr. '06	....	....
K. & H. C. & C. 1st s f g 5s	....	....	98	Dec. '12	97½	98½
Pocah. Con. Coll. 1st s f 5s	87	88½	87½	87½	81½	89½
St. L. Rky. Mt. & Pac. 1st 5s	77½	78½	78½	78½	79½	84½
Tenn. Coal gen. 5s	102¾	Sale	102½	103	101½	103⅞
Birm. Div. 1st consol. 6s	102½	103	102½	Dec. '12	102½	104½
Tenn. Div. 1st g 6s	101½	103¾	101½	Dec. '12	101½	104
Cah. C. M. Co. 1st g 6s	103½	....	110	Jan. '09	....	....
Utah Fuel 1st g 5s	....	....	....	....	....	....
Victor Fuel 1st s f 5s	....	83	85½	Oct. '12	85½	86
Va. I. Coal & Coke 1st g 5s	96½	97	97	97	94½	98½

Reading Co.—Regular quarterly dividend of 1% on first preferred, payable Mar. 13, to holders of record Jan. 27.

Consolidation Coal Co.—Regular quarterly of 1½%, payable Jan. 31, to holders of record Jan. 23.

Monongahela Cons. C. & C. Co.—Dividend of $3.50 on the preferred, payable Jan. 25.